
Wholesale Local Access Market Review: Draft Statement – Volume 3

Physical infrastructure access remedy

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1. Introduction

Background

- 1.1 This volume forms part of our review of the Wholesale Local Access (WLA) market and sets out how our decisions concerning duct and pole access (DPA) are designed to remedy the competition concerns arising from BT's significant market power (SMP).¹ Enhancing the effectiveness of the existing Physical Infrastructure Access (PIA) remedy reflects our shift in strategic focus from active to passive remedies.

Key decisions

- 1.2 Improving access to BT's network of poles and underground ducts that carry telecoms cables will make it quicker and easier for rival providers to build their own fibre networks, promoting infrastructure-based competition. Our key decisions are as follows.
- **Access to BT's ducts and poles.** BT must allow other telecoms providers access to deploy their own networks in BT's underground ducts and chambers or overhead on its telegraph poles. This network access obligation also requires Openreach to make adjustments to the existing infrastructure, so it is 'ready for use' – repairing faulty infrastructure and relieving congested sections where necessary.
 - **Enabling greater flexibility in the use of ducts and poles.** We are relaxing the current PIA usage restriction to allow 'mixed usage': telecoms providers can deploy local access networks offering both broadband and non-broadband services, provided the primary purpose of the network deployment is the delivery of broadband services.
 - **Access on equivalent terms to ensure a level playing field.** BT is subject to a 'no undue discrimination' condition, requiring strict equivalence in respect of all processes and sub-products that contribute to the supply and consumption of duct access, unless BT can demonstrate that a difference is justified. We will support these measures through ongoing monitoring to ensure that they are effective.
 - **Access to digital maps to support large-scale network planning.** Telecoms providers must be provided with integrated access to digital maps with Openreach's duct and pole network records, including detailed location information and the extent of spare capacity.
 - **Processes to ensure efficient network deployment.** BT is required to publish a Reference Offer, setting out how operational processes (e.g. ordering PIA, clearing blocked ducts) will work, together with relevant terms and conditions including service level agreements and guarantees.
 - **Pricing to support competitive investment.** We are setting a cap on PIA rental charges which results in significant reductions compared to current rental charges. Costs associated with making the existing infrastructure ready for use will be recovered from

¹ The regulatory framework for this market review is as outlined in 2018 Wholesale Local Access Market Review Statement, Volume 1, paragraphs 2.27 to 2.44.

all users of the infrastructure, up to a limit of £4,750 per kilometre, with other ancillary charges required to be cost-based. We are also placing financial reporting requirements on BT, so that we can monitor the effectiveness of the pricing regulation and the 'no undue discrimination' condition, in terms of the recovery of costs between BT's own use and that of other telecoms providers using duct and pole access.

Duct and pole access remedies

- 1.3 Our Strategic Review of Digital Communications (the “Strategic Review”) identified five actions to address the challenges faced by telecoms providers, noting the historically limited take-up of PIA:
- **usage restrictions:** removing usage restrictions where the PIA remedy is used to deploy broadband access networks to homes and businesses at scale;
 - **equivalence of inputs:** working to apply equivalence of inputs between BT and other telecoms providers, for example, in terms of timescales, processes and terms and conditions;
 - **better information:** requiring Openreach to provide an online database of duct and pole assets so competitors can plan new networks;
 - **efficient operational processes:** ensuring operational processes are efficient, appropriately streamlined and established early; and
 - **pricing:** reviewing pricing of the PIA remedy, including ancillary service charges.
- 1.4 There was broad agreement among industry respondents to our consultations that we had correctly identified the problems faced by telecoms providers using PIA.

Access to BT's ducts and poles

- 1.5 We are imposing a specific access remedy in the form of PIA which would require BT to allow other telecoms providers access to deploy their own networks in BT's underground ducts and chambers or overhead on its telegraph poles.
- 1.6 The network access obligation includes a requirement to make adjustments to the existing infrastructure in order to make it available to another telecoms provider for the purpose of providing electronic communications services. For example, it may be necessary to repair or enhance congested sections of the infrastructure.
- 1.7 In considering the form of network access obligations generally, our starting point is not to impose any restrictions on use or scope, since in most instances, such restrictions are unnecessary. However, PIA can be used as an upstream input into several downstream products and, given our assessment of the market in this review, it would be inappropriate to put in place a PIA remedy for purposes which make no contribution towards remedying the competition concerns in the WLA market. The usage restrictions on the current PIA remedy were designed to address this issue.
- 1.8 However, we do consider that it is appropriate to relax the current PIA usage restriction to allow 'mixed usage': telecoms providers can deploy local access networks offering both broadband and non-broadband services, provided the primary purpose of the network

deployment is the delivery of broadband services. This is necessary to support the commercial business case for investment by increasing the ability of network operators to adjust technology choices as the market develops and exploit economies of scope, generating different revenue streams through delivering different services over a single network infrastructure.

Access on equivalent terms to ensure a level playing field

- 1.9 Ensuring other telecoms providers are not discriminated against by BT, and therefore, on a level playing field with BT's downstream activities (both Openreach's wholesale broadband products and BT divisions such as BT Consumer), is necessary to ensure the PIA remedy is effective, and that competing network builders have confidence to invest in ultrafast broadband networks. In the absence of a regulatory obligation to ensure equivalent access, BT would be able to engage in practices that could distort downstream competition, including providing access on less favourable terms compared to those obtained by its own downstream activities.
- 1.10 BT's broadband fibre networks are currently deployed by Openreach, and so our focus is on ensuring Openreach does not have an unfair advantage over competing network builders. Openreach uses its physical infrastructure as an input to other products that Openreach itself makes available. PIA is not a single standard product, but consists of a number of processes and sub-products. Ensuring equivalence of access to BT's ducts and poles is therefore more complex than for a single product that Openreach sells directly to BT's downstream businesses and other telecoms providers. We have adopted a flexible approach which enables Openreach to retain efficiencies in providing duct access, and to avoid unnecessary re-engineering of its legacy products and processes, while preventing it from disadvantaging other telecoms providers, in terms of extra cost, time or uncertainty.
- 1.11 We are imposing a 'no undue discrimination' SMP condition on BT. While this condition does permit discrimination in certain circumstances, we interpret the requirement as requiring strict equivalence in respect of all processes and sub-products that contribute to the supply and consumption of duct access, unless BT can demonstrate that a difference in respect of a specific process step or sub-product is justified.
- 1.12 When BT establishes new processes or platforms that contribute to the supply and consumption of duct access, these should be designed and implemented from the outset to be equivalent; not differing from those used by other telecoms providers, other than in the most exceptional circumstances.
- 1.13 We are putting in place an ongoing monitoring programme, supported by financial reporting requirements on BT, to ensure these measures are effective, and create an environment in which competing providers have confidence to make very substantial capital investments relying on access to BT's duct and pole network.

Pricing to support competitive investment

- 1.14 We have reviewed both the rental and ancillary charges for PIA to ensure the remedy is effective, both in terms of access charges which support the take-up of the remedy and competitive investment, as well as ensuring competing network providers are on a level playing field with Openreach's downstream products which make use of ducts and poles.
- 1.15 We are imposing a cap on rental charges to address the risk that BT might exploit its SMP by setting high prices. In addition, setting a cap provides certainty and predictability over the level of charges which supports investors' ability to build a viable business case for network deployment using BT's ducts and poles.
- 1.16 The price calculation methodology we have adopted reflects the most recent cost data available from Openreach and our decision that the costs incurred in setting up and managing the remedy should be recovered from all users of the ducts and poles, to ensure a level playing field with the costs faced by Openreach itself when using the infrastructure.
- 1.17 The resulting cap for key rental charges is set out in the table below, alongside Openreach's current charges.

Table 1.1 Cap on rental charge (per year)

	Current charge	Charge cap
Single bore spine duct (per metre)	£0.60	£0.28 (-53%)
Lead-in duct (per metre)	£0.84	£0.56 (-33%)
Facility on pole for Single-end-user attachment	£8.85	£4.79 (-46%)

- 1.18 Existing ancillary charges relate to a variety of activities. We are retaining regulation which requires these charges to be cost oriented.
- 1.19 For key ancillary charges relating to adjustments to BT's physical infrastructure, we have decided that the associated costs should be recovered from all users of the infrastructure, to reduce the barriers to competitive network investment at scale and ensure a level playing field with the charges Openreach faces itself for using its own ducts and poles. To mitigate the risk that the costs are higher than we anticipate, with greater potential for the costs of new entry to outweigh the gains, a financial limit will apply, with costs associated with infrastructure adjustments above £4,750 per kilometre being recovered directly from the telecoms provider making the request. In addition, the financial limit will ensure Openreach has sufficient certainty over the level of costs that it needs to recover in this way.
- 1.20 We are also placing financial reporting requirements on BT so we can monitor the effectiveness of the pricing regulation and the 'no undue discrimination' condition, in terms of the recovery of costs between BT's own use and that of other telecoms providers using duct and pole access.

Processes to support efficient network deployment

- 1.21 Openreach has acknowledged the need to develop its duct and pole access further. In the last year it has simplified processes in a number of areas, and launched a new digital map which other telecoms providers can access. While we welcome this as positive progress, more needs to be done to ensure there is effective access to BT's ducts and poles.
- 1.22 Our focus has been on the process improvements necessary to enable rival providers to efficiently deploy their own broadband access networks at scale, using BT's ducts and poles.
- 1.23 Our conclusions relate to the activities required to deploy an access network, which can be broadly categorised into three main stages:
- **Planning and surveying:** access to network records, including location information and the extent of spare capacity available; ability to download information at sufficient scale, enabling integration with telecoms providers' own geographic planning tools; providing for a degree of surveying to verify planning assumptions and identify any required adjustments, both to underground ducts and overhead poles;
 - **Network deployment:** processes for Openreach to undertake build works (installing new infrastructure capacity if necessary); streamlining processes by allowing telecoms providers to undertake their own enabling works (for example, clearing blocked ducts); and processes for recharging for work when it falls within the scope of the network access obligation with Openreach authorisation;
 - **Connecting the customer:** obligation on Openreach to ensure there is capacity on poles for additional dropwires so that telecoms providers can use overhead lead-ins to connect to customers, while allowing Openreach the operational flexibility to determine how best to provide such capacity; enabling telecoms providers to interconnect into existing underground ducted lead-ins.
- 1.24 We have decided that BT should be required to publish a Reference Offer in relation to the provision of PIA, setting out relevant terms and conditions.
- 1.25 We recognise that there is also practical work required to implement our decision on the appropriate service level agreements and guarantees and our decision to apply a financial limit to ensure efficient PIA processes are in place which support large scale network deployment. This requires industry engagement, with Openreach and telecoms providers well placed to take forward the detailed implementation, which we will continue to support. Therefore, we are also requiring BT to update its Reference Offer to implement these requirements by 1 April 2019.

Implementation timetable and next steps

- 1.26 The physical infrastructure access and associated obligations (including the requirement to make network adjustments) will enter into force after one month to allow BT to make any administrative changes to the current Reference Offer which may be necessary. Certain other requirements, in particular concerning service level agreements and guarantees, and

arrangements for self-build by access seekers, will apply once the revised Reference Offer is in place by 1 April 2019.

- 1.27 Recognising the time BT needs to implement new processes and procedures for Openreach funded network adjustments, the introduction of the financial limit for network adjustments will also apply from 1 April 2019, with a cost orientation obligation applying up until this point. All other pricing obligations will come into force after one month.
- 1.28 We will work with Openreach and telecoms providers as they take forward the detailed implementation of the remedy, including the publication of the Reference Offer. In addition, we will put in place an ongoing monitoring programme to ensure the remedy is effective.

Background

History of the PIA Remedy

- 1.29 The PIA remedy was originally introduced following our review of the WLA market in 2010.² The remedy required BT to allow third parties to deploy broadband networks using its physical infrastructure located in the local access network. It was primarily intended to facilitate telecoms providers wishing to offer services in advance of BT's superfast broadband roll-out, particularly to increase the contestability of public funding to support new networks. However, the interest from competing providers to BT for these public funds, under Broadband Delivery UK (BDUK), ultimately failed to materialise.
- 1.30 We continued to impose a duct and pole access remedy following our review of the WLA market as part of our Fixed Access Market Review in 2014. In the years following the imposition of this remedy, there continued to be limited take up by telecoms providers, and limited motivation to develop the remedy further.

Our initial proposals to develop an effective PIA remedy

- 1.31 In our Strategic Review we set out that we consider competition between different networks is the most effective spur for innovation and continued investment in high quality, fibre networks. We therefore announced that a major area of strategic focus would be support for investment and innovation in ultrafast broadband networks by providing BT's competitors with improved access to its duct and pole infrastructure.
- 1.32 In July 2016 we published a progress update on how we intended to address the challenges we set out in the Strategic Review. In the following December we published our 2016 PIA Consultation, where we outlined our initial ideas on how to make the existing PIA remedy more effective.
- 1.33 Our initial views reflected the principle that telecoms providers should not be disadvantaged compared with BT's own downstream businesses when using BT's duct and

² 2010 WLA Statement, Section 7. https://www.ofcom.org.uk/_data/assets/pdf_file/0027/37935/wla_statement.pdf.

pole infrastructure to deploy ultrafast broadband services, whether in terms of the processes that a network builder faces, or the charges incurred. We discussed improved duct and pole access in three areas:

- **How PIA should be used:** providing greater flexibility to permit telecoms providers to offer both ultrafast broadband services as well as business leased lines over a shared network;
- **How PIA should work:** improving and streamlining processes for planning, network deployment, and connecting the customer (e.g. upgrading dropwires which connect BT's poles to individual houses);
- **How PIA pricing can support competitive investment:** providing certainty over the level of PIA charges and recovering the costs associated with PIA in the same way BT recovers these costs for its own network deployments, e.g. by spreading them across all services which make use of the duct.

April 2017 DPA Consultation and August 2017 DPA Consultation

- 1.34 In our April 2017 DPA Consultation we set out our proposals on: the form of access to BT's ducts and poles; terms of access to support a level playing field; operational processes that support efficient network deployment; and pricing that supports competitive investment.
- 1.35 In our August 2017 DPA Consultation, we provided further detail on our pricing proposals for the rental charges cap; the pricing of ancillary services and financial limit relating to recovering network adjustment costs across all user of the physical infrastructure; and future financial reporting.

The scope of this volume of the WLA Market Review

- 1.36 Following on from our decision in the WLA Statement Volume 1 ('Volume 1') to designate BT as having SMP on the WLA market, this volume sets out our decisions on the proposals we set out in April 2017 and August 2017.
- 1.37 In Volume 1 we set out our decision to impose certain SMP conditions which are also relevant to the decisions set out in this volume of the statement ('Volume 3'); relating to notification of charges and terms and conditions, notification of technical information, quality of service and regulatory financial reporting. Since these conditions are proposed to apply to all forms of wholesale network access provided in the WLA market, they will also apply in respect of the PIA requirement which we are proposing in this volume. Specifically:
- Condition 9 - notification of charges and terms and conditions: the obligation imposed in Volume 1 for BT to notify changes to charges for wholesale network access products and services, and also changes to their terms and conditions, will apply to PIA;
 - Condition 10 - notification of technical information: the obligation imposed in Volume 1 for BT to notify technical information in advance of providing new wholesale services or amending existing technical terms and conditions will also apply to PIA;

- Condition 11 - quality of service: the obligation imposed in Volume 1 for BT to comply with all such quality of service requirements and to publish all such information as to the quality of service in each case as Ofcom shall direct will also apply to PIA; and
 - Condition 12 - regulatory financial reporting: the accounting separation and cost accounting obligations imposed in Volume 1 will also apply to PIA.
- 1.38 In each case, these decisions as set out in Volume 1 should be read alongside the decisions set out in Volume 3.
- 1.39 More generally, Volume 1 imposes a general network access requirement for BT to give access on reasonable request, which is supported by a statement of requirements process that applies to requests for new forms of network access. While these decisions are not directly affected by the decisions set out in this volume of the statement, they could form the basis for a request for a different form of duct and pole network access in the future.

Structure of this Volume

- 1.40 The remainder of this volume is structured as follows:
- **Section 2:** Physical infrastructure access remedy
 - **Section 3:** Non-discrimination requirements
 - **Section 4:** Recovery of PIA related costs
 - **Section 5:** Price regulation of PIA
 - **Section 6:** Improvements to PIA process and systems
 - **Section 7:** Implementation timetable
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- **Annex 24:** Risk to BT's cost recovery from mixed usage
 - **Annex 25:** Asset cost component calculation
 - **Annex 26:** Calculation of the financial limit

2. Physical infrastructure access remedy

- 2.1 In this section, we set out our decision to impose a specific network access obligation on BT requiring it to provide access to its physical infrastructure. We explain why such a requirement is necessary. We then set out our view on the scope of the access obligation, in terms of:
- the extent to which the PIA obligation we are imposing requires BT to make adjustments to its infrastructure network where it is currently unusable, either because the existing infrastructure is faulty or because there is insufficient capacity; and
 - the scope of the remedy, both in terms of allowed uses of the remedy and the geographic scope of the remedy.

Specific access remedy

Our proposals

- 2.2 In the April 2017 DPA Consultation, we proposed to impose a specific network access remedy in the form of PIA, which would require BT to allow other telecoms providers access to deploy their own networks in BT's underground ducts and chambers or overhead on its poles. We considered that without access to BT's physical infrastructure network, large-scale network deployment in significant parts of the country is unviable.
- 2.3 Given our provisional conclusion that BT has SMP in this market, we considered it likely that BT would have the incentive and ability to favour its own downstream businesses over rivals in the relevant downstream markets, distorting competition in these markets, which is ultimately against the interests of consumers. Therefore, in the absence of a requirement to provide PIA, BT could refuse access to its physical infrastructure, or it could provide access to its physical infrastructure on less favourable terms and conditions compared to those obtained by its own downstream businesses.
- 2.4 We considered whether the ATI Regulations address our competition concerns sufficiently such that it would be unnecessary to impose a duct and pole access remedy on BT, but provisionally concluded that they do not. We considered that achieving effective competition in the context of the WLA market requires robust SMP regulation in the form of a fully specified access remedy.
- 2.5 We believed that an effective PIA remedy would reduce the absolute costs and time required to build ultrafast broadband networks at scale, and that this is a key factor in helping to promote competition and investment in rival networks. We believed that this would help make network competition at scale viable and, in due course, result in downstream services becoming potentially competitive in many geographic areas.

Stakeholder responses

- 2.6 The majority of stakeholders agreed that a specific network access remedy in the form of PIA is required.
- 2.7 With respect to the ATI regulations, Hyperoptic agreed that the ATI regulations do not address competition concerns.³ However, Openreach said that we had not carried out a proper analysis of the potential benefits of the ATI regulations. It also argued that our proposed remedies conflict and undermine certain provisions of the ATI Regulations and risk distorting competition.⁴

Our reasoning and decisions

- 2.8 As explained in Section 5 of Volume 1, “Approach to remedies”, we consider that there are significant benefits to consumers from competition based on rivals investing in their own networks, compared to competition based on regulated access to BT’s network and services. We see this approach as key to promoting effective competition in the WLA market.
- 2.9 However, the high costs of deploying physical infrastructure, such as ducts and poles, remain a barrier to large-scale network deployment in significant parts of the country.⁵ These costs constitute a large proportion of the overall capital expenditure required to deploy an end-to-end fibre network. Our own estimates suggest that reusing existing infrastructure enables significant cost savings, reducing the average cost per home passed in some cases by up to 50%, from around £500 to £250 (excluding lead-ins).⁶ Reusing existing underground ducts can also reduce the time it takes to deploy a new network: whereas in some cases it can take days to build 200m of duct using traditional construction methods, fibre cables could be installed in the same length of existing duct in a matter of hours.⁷ BT has an extensive physical infrastructure network that reaches most homes and businesses in the UK and BT’s ability to reuse this legacy infrastructure, much of which predates market liberalisation, gives it a significant advantage over its competitors.⁸

³ Hyperoptic response to the April 2017 DPA Consultation, 20 April 2017, page 9.

⁴ Openreach response to the April 2017 DPA Consultation, 20 April 2017, paragraph 162.

⁵ As explained in Section 4 of Volume 1, “Market power assessment”, we consider that there are still very high entry barriers to constructing a significant scale local access network independent of the incumbent’s network.

⁶ Informed by various industry estimates of the upfront costs of deploying a full-fibre network, we assume that the upfront civils costs are around £350 per home passed and the upfront costs of fibre/active equipment are around £150 per home passed. We assume that civils costs scale according to the proportion of PIA used, and assume this proportion could be as high as 75%. These cost estimates exclude the cost of installing the final drop.

⁷ DCMS, November 2011. *Microtrenching and Street Works: An advice note for Local Authorities and Communications Providers*, paragraph 2.11,

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/77427/Microtrenching_guidance_NOV2011.pdf

⁸ Our conclusion that BT will continue to have SMP in the supply of WLA services in the UK excluding the Hull Area for the period of this review reflects, among other things, the high barriers to entry into the WLA market, arising particularly from the scale of the investment needed to do so, and the fact that a large part of the costs incurred are likely to be sunk costs. See Section 4 of Volume 1, “Market power assessment”.

Without access to BT's physical infrastructure network, large-scale network deployment in significant parts of the country is likely to be unviable.

- 2.10 Given our conclusion that BT has SMP in this market, we remain of the view that it is likely that BT would have the incentive and ability to favour its own downstream businesses over rivals in the relevant downstream markets, distorting competition in these markets, which is ultimately against the interests of consumers. Therefore, in the absence of a requirement to provide PIA, BT could refuse access to its physical infrastructure, or it could provide access to its physical infrastructure on less favourable terms and conditions compared to those obtained by its own downstream businesses.

The ATI Regulations do not address our competition concerns

- 2.11 The ATI Regulations set out measures intended to reduce the cost of deploying high-speed electronic communications networks. These measures include sharing the physical infrastructure of telecoms network providers as well as physical infrastructure across different sectors (such as electricity, water and transport services) and certain associated obligations (such as access to information). Among others, the ATI Regulations provide for a network provider to access such infrastructure on fair and reasonable terms for the purposes of deploying elements of a high-speed electronic communications network.
- 2.12 We remain of the view that the ATI Regulations do not address our competition concerns sufficiently such that it would be unnecessary to impose a duct and pole access remedy on BT. We disagree with Openreach that we have not considered this properly, and set out our reasoning below.
- 2.13 The ATI Regulations are conceived as a means of facilitating commercial agreements for access on fair and reasonable terms, with Ofcom providing dispute resolution in the event no agreement can be reached. Consequently, they do not provide for a fully specified DPA remedy of the type that we consider is necessary to impose in the context of this market as a remedy for BT's SMP.
- 2.14 There are areas where the rights and obligations established in the ATI Regulations may not be sufficient to encourage network deployment at scale based on access to BT's physical infrastructure. For example:
- a) Although the ATI Regulations enable telecoms providers to obtain existing information held about the infrastructure, the regulations do not require information to be provided in a format other than that in which that information is already held. As explained in Section 6, we consider that it is important that network records should be provided to telecoms providers in a digital format that is able to be integrated into telecoms providers' geographic network planning tools, such that they can effectively plan their network deployments at scale. Under the ATI Regulations, telecoms providers would be dependent on BT voluntarily doing this to the extent that BT did not hold information in this form.
 - b) The ATI Regulations do not specify the operational processes or detailed timescales for interacting with the infrastructure operator at the different stages of an access

network deployment. We consider that telecoms providers need certainty and confidence around the operational processes and timescales if they are to rely on infrastructure sharing to deploy a network at scale. Some of the issues identified with the existing processes under the current PIA remedy serve to highlight the importance of being able to impose specific obligations regarding operational processes and timescales. While there may be some scope to develop operational processes or detailed timescales through the access terms and conditions that might be imposed under the ATI Regulations, the extent to which these could be specified is likely to be much more limited than under the telecoms *ex ante* framework.

- c) There is significant uncertainty as to the prices that will be charged for access under the ATI Regulations, both generally and as between different instances where they apply. Under the ATI Regulations, there is a range of factors which we must consider in resolving a dispute and the precise approach will depend on the specific circumstances of each dispute.⁹ In principle, a range of prices and pricing approaches might satisfy the considerations we are required to take into account when resolving a dispute.¹⁰ Moreover, given the differences between the framework for determining prices in resolving disputes under the ATI Regulations and the framework for setting a price under SMP regulation, it is likely that the respective prices would differ significantly. For example, Openreach suggested that the rules around charges for civil works associated with making the physical infrastructure ready are more favourable to access seekers than charges set under the ATI Regulations.¹¹
- d) The ATI Regulations do not include any explicit obligations to prevent vertically integrated infrastructure operators from discriminating between their own downstream businesses and rival access seekers when providing access.¹² Without confidence that a level playing field will be maintained these potential competitors are unlikely to invest at scale.

2.15 Further, although access seekers can refer disputes to us under the ATI Regulations, the lack of certainty in an *ex post* dispute resolution process is likely to act as a barrier to relying on this as the means to access BT's physical infrastructure to deploy a network at scale. In our consultation on guidance under the ATI Regulations, some stakeholders expressed concerns that the ATI Regulations would not be an effective substitute for SMP regulation and were concerned about the effectiveness of *ex post* dispute resolution

⁹ See Guidance under the Communications (Access to Infrastructure) Regulations 2016, paragraphs 5.13 to 5.29. https://www.ofcom.org.uk/data/assets/pdf_file/0025/95191/Guidance-under-the-Communications-Access-to-Infrastructure-Regulations-2016.pdf.

¹⁰ See Guidance under the Communications (Access to Infrastructure) Regulations 2016, footnote 20.

¹¹ Openreach response to the April 2017 DPA Consultation, paragraph 72.

¹² Under the ATI Regulations, access must be provided on fair and reasonable terms (Regulation 6(2)). Information about physical infrastructure must be made available on proportionate, non-discriminatory and transparent terms (Regulation 4(3)).

processes established under the ATI Regulations, particularly in comparison with *ex ante* regulation under the European Framework.¹³

- 2.16 We also observe that if the ATI Regulations were an effective means of accessing BT's physical infrastructure (as Openreach claims), we would expect to have seen greater use of the ATI Regulations as a basis for accessing BT's physical infrastructure.¹⁴
- 2.17 Therefore, we do not consider that the ATI Regulations address effectively the competition concerns arising from BT's market power. We consider that achieving effective competition in the context of the WLA market requires robust SMP regulation in the form of a fully specified access remedy. Indeed, the challenges faced by other telecoms providers in using BT's ducts and poles under the existing PIA remedy serve to highlight this.
- 2.18 Moreover, the ability to access other (i.e. non-BT) infrastructure under the ATI Regulations does not sufficiently address our competition concerns arising from BT's market power. Although other infrastructure operators may not have the same incentive as BT to refuse access or provide access on unfavourable terms, many of the issues above still apply. We also understand that the greatest interest for broadband deployment remains in using BT's duct and pole infrastructure, which is perhaps unsurprising given the ubiquity of the BT infrastructure network and the fact that it was purpose-built to deploy a telecommunications network.
- 2.19 In relation to Openreach's argument that our proposed remedies conflict and undermine certain provisions of the ATI Regulations, we do not agree. In our guidance under the ATI Regulations, we explain how the ATI Regulations interact with SMP regulation.¹⁵ We explain that the aims of the ATI Regulations and SMP regulation differ and that obligations imposed under the European Framework requiring the provision of network access to physical infrastructure are not restricted by the ATI Regulations.

We are imposing a specific access remedy

- 2.20 In light of the above, we are imposing a specific network access remedy in the form of PIA, which would require BT to allow other telecoms providers access to deploy their own networks in BT's underground ducts and chambers or overhead on its poles. We believe that an effective PIA remedy will reduce the absolute costs and time required to build ultrafast broadband networks at scale. This is a key factor in helping to promote competition and investment in rival networks. We believe that this will help make network competition at scale viable. In our view, an effective PIA remedy will, in due course, result in downstream services becoming potentially competitive in many geographic areas.
- 2.21 The remedy will also require BT to provide any ancillary services as may be reasonably necessary to enable and support the provision of PIA. Ancillary Services are those services

¹³ These views were shared with us when we consulted on our guidance under the ATI Regulations. See Statement following consultation on Guidance under the ATI Regulations, paragraph 1.8.
https://www.ofcom.org.uk/_data/assets/pdf_file/0026/95192/Statement-following-consultation-on-Guidance-under-the-Communications-Access-to-Infrastructure-Regulations-2016.pdf.

¹⁴ To date, we are not aware of any telecoms providers making use of the ATI Regulations.

¹⁵ See Guidance under the Communications (Access to Infrastructure) Regulations 2016, paragraphs 1.7 to 1.8.

that are reasonably necessary to enable the use of PIA, for example: power; access to BT's exchanges; and a database containing detailed network records of BT's physical infrastructure. These are considered at the end of this section.

Network adjustments

- 2.22 The current PIA remedy requires Openreach to set out, in a Reference Offer, arrangements for relieving congested physical infrastructure, including the repair of existing faulty infrastructure and the construction of new physical infrastructure. Under the current Reference Offer, Openreach offers services to allow certain work to be undertaken, including the recovery of redundant cables, the repair of existing faulty infrastructure (e.g. blockage clearance, replacement ducts, chambers or poles) and the construction of new physical infrastructure where the existing capacity is insufficient. Any work is currently funded via upfront charges to the telecoms provider requesting the work, and any resulting new infrastructure which is built is owned and maintained by BT and incorporated into BT's infrastructure access network.

Our proposals

- 2.23 In our April 2017 DPA Consultation, we said that the obligation on BT to provide network access includes making adjustments in order to make available to another user facilities and/or services for the purpose of providing electronic communications services. We considered that Openreach should adjust the physical infrastructure network to make it ready for use. We explained that given the range of options available to Openreach, this will generally be more efficient than for a telecoms provider to install its own infrastructure to bypass the sections of infrastructure which they cannot use. We said that in the absence of such a requirement, the additional cost, time and operational complexity faced by telecoms providers is likely to deter them from investing in competing networks at scale.
- 2.24 With respect to specifying this obligation, we proposed to maintain the general network access requirement but supplement this with guidance on where this obligation would apply. We set out our proposed guidance, taking into account the factors set out in section 87(4) of the Act. Our guidance considered how these factors might apply to various examples to illustrate the situations where we would expect the obligation applies, and situations where it does not.
- 2.25 We also proposed that Openreach should be able to choose how to remedy unusable sections of physical infrastructure, providing it with the flexibility to choose the most efficient solution possible, and allowing it to take account of its own future requirements.

Stakeholder responses

- 2.26 Most stakeholders were generally supportive of the network adjustment obligation, with some of the view that it will increase incentives for Openreach to improve its management

- of the network.¹⁶ Openreach welcomed clarification that network adjustments are not to create new infrastructure.¹⁷
- 2.27 Openreach argued that it should only have to bear the costs of adjustments where there are clear material benefits to Openreach infrastructure and its customers.¹⁸ It put forward that it would not necessarily be cheaper for it to adjust its network,¹⁹ and disagreed that it being able to deploy network at a lower cost than providers is a competitive advantage.²⁰
- 2.28 Several stakeholders considered that the guidance on what Openreach is obligated to do should be made more explicit.²¹ Openreach stated its expectation that further details on network adjustments will need to be resolved through industry dialogue.²² It considered it necessary that the new Reference Offer specify among other things, the range of network adjustments that fall within the scope of PIA.²³
- 2.29 Several stakeholders commented on the examples set out in the April 2017 DPA Consultation to illustrate the situations where we would expect the obligation applies:
- a) Regarding our proposals on existing physical infrastructure which is blocked or damaged, Openreach considered that where a duct is repairable, the repair should be carried out by the provider, as there would be no speed or cost advantage to Openreach carrying out the repair.²⁴ Callflow believed that Openreach should be required to clear all “obstructions”, such as trees²⁵, although Openreach countered that this is not an Openreach responsibility.²⁶ Openreach also disagreed that it should have to fund and install new footway boxes, and argued that Ofcom does not provide a means to differentiate between cable installation and genuine network adjustments.²⁷ Finally, it considered that there are many alternatives to using the Openreach network, and that it should not always be assumed to be Openreach’s responsibility to provide new network unless it has been proven to be necessary.²⁸ In the case of lead-ins that run under third-party private property or in the public highway, Virgin Media argued that Openreach should be required to rectify the problem on behalf of the provider.²⁹

¹⁶ [3<]; Vodafone response to the April 2017 DPA Consultation, paragraph 9.

¹⁷ Openreach response to the April 2017 DPA Consultation, paragraph 18.

¹⁸ Openreach response to the April 2017 DPA Consultation, paragraph 100.

¹⁹ Openreach response to the April 2017 DPA Consultation, paragraphs 128 to 130.

²⁰ Openreach response to the April 2017 DPA Consultation, paragraph 132.

²¹ Flomatik response to the April 2017 DPA Consultation, page 2; Hyperoptic response to the April 2017 DPA Consultation, page 9; Sky response to the April 2017 DPA Consultation, paragraph A5.12; TalkTalk response to the April 2017 DPA Consultation, pages 4 to 5, paragraph 3.5 (page 6 on confidential version).

²² Openreach response to the April 2017 DPA Consultation, page 4.

²³ Openreach response to the August 2017 DPA Consultation, paragraph 88.

²⁴ Openreach response to the April 2017 DPA Consultation, paragraph 136.

²⁵ Callflow response to the April 2017 DPA Consultation, page 1.

²⁶ Openreach response to the April 2017 DPA Consultation, paragraph 124.

²⁷ Openreach response to the April 2017 DPA Consultation, paragraph 124.

²⁸ Openreach response to the April 2017 DPA Consultation, paragraph 136.

²⁹ Virgin Media response to the April 2017 DPA Consultation, page 1.

- b) Where there is insufficient capacity up to the final distribution point, Openreach agreed that it should only be required to relieve “pinch points”³⁰, and that it should not be required to provide large amounts of new capacity. However, it noted that it will need to reach agreements with industry on how such limitations will be imposed.³¹ Openreach also considered that the rules for the use and adjustment of chambers will need to be specified.³²
 - c) Openreach supported our proposals that it should not have to install new underground lead-ins where there is insufficient capacity in underground lead-in ducts.³³ CityFibre also agreed with this, although believed it should be mandatory for Openreach to relieve congestion where cable is directly buried in other parts of the network.³⁴ Hyperoptic suggested that where new lead-ins are required, providers should be responsible for installing new duct and should own this.³⁵
 - d) On relieving capacity on distribution poles, Openreach noted that in some cases it would be more efficient for a telecoms provider to carry out and pay for the work.³⁶ Openreach argued that it should not be required to provide additional poles³⁷, and stressed that strengthening a pole by adding a stay does not necessarily add capacity.³⁸ It disagreed that it should have to make an unclimbable pole climbable, and stressed that any SMP condition should be linked to usable, rather than defective poles.³⁹ Issues to do with insufficient pole capacity should be dealt with by industry as part of the Reference Offer development, and Ofcom should allow Openreach the flexibility to amend and/ or interpret its proposals as part of this process.⁴⁰ Following this, Hyperoptic suggested that relieving capacity on poles requires more discussion between Openreach and industry.⁴¹
- 2.30 Openreach broadly agreed that it should be able to choose how to relieve congested infrastructure, although it set out a series of conditions that should be met.⁴² Meanwhile, some stakeholders considered that measures will be needed to ensure that Openreach does not use its flexibility to undermine the effectiveness of the remedy.⁴³

³⁰ Openreach response to the April 2017 DPA Consultation, paragraph 144.

³¹ Openreach response to the April 2017 DPA Consultation, paragraph 138.

³² Openreach response to the August 2017 DPA Consultation, paragraph 136.

³³ Openreach response to the April 2017 DPA Consultation, paragraph 135.

³⁴ CityFibre response to the August 2017 DPA Consultation, paragraph 5.1.4.

³⁵ Hyperoptic response to the April 2017 DPA Consultation, page 9.

³⁶ Openreach response to the April 2017 DPA Consultation, paragraph 140.

³⁷ Openreach response to the April 2017 DPA Consultation, paragraph 140.

³⁸ Openreach response to the April 2017 DPA Consultation, paragraph 131.

³⁹ Openreach response to the August 2017 DPA Consultation, paragraph 166.

⁴⁰ Openreach response to the August 2017 DPA Consultation, paragraph 169.

⁴¹ Hyperoptic response to the April 2017 DPA Consultation, page 9.

⁴² Openreach response to the April 2017 DPA Consultation, paragraph 146.

⁴³ Hyperoptic response to the April 2017 DPA Consultation, page 9; TalkTalk response to the April 2017 DPA Consultation, paragraph 3.7.

Our reasoning and decisions

- 2.31 We are imposing an obligation on BT to provide network access in the form of PIA. The concept of network access includes making adjustments in order to make available to another user facilities and/or services for the purpose of providing electronic communications services. Therefore, the PIA obligation we are imposing includes a requirement on BT to make adjustments to its physical infrastructure network in the circumstances explained below (which we refer to in this section as “network adjustments”). In setting the scope of PIA, we have assessed what level of adjustment is appropriate and proportionate to make BT’s physical infrastructure network available in the context of BT’s SMP in this market. Specifically, we consider below the extent of this obligation where BT’s physical infrastructure network is unusable.

Openreach should be required to make adjustments to its infrastructure where it is unusable

- 2.32 Telecoms providers using PIA to deploy a competing network will encounter sections of infrastructure which they cannot use, either because the existing infrastructure is faulty or because there is insufficient capacity in that section.⁴⁴ For the reasons set out below, we remain of the view that the remedy will be ineffective unless Openreach is required to adjust the physical infrastructure network to make it available for use in certain circumstances.
- 2.33 Our rationale for requiring BT to provide network access in the form of PIA is to promote competition by facilitating third party investment in competing infrastructure. We consider that the efficiencies arising out of deploying a network using PIA, instead of building a new physical infrastructure network, will facilitate investment which would not otherwise be viable. In particular, rival telecoms providers avoid the costs and time associated with duplicating the physical infrastructure network, and instead only pay a share of the costs of the existing physical infrastructure. Our objective in imposing PIA is to unlock these efficiencies to the greatest extent possible to help facilitate such investment.
- 2.34 When a telecoms provider encounters an unusable section of BT’s physical infrastructure when deploying a rival access network using PIA, it will be necessary to overcome this. One approach would be for telecoms providers to install their own ducts or poles alongside BT’s to circumvent the unusable section in BT’s infrastructure. Another approach would be for Openreach to adjust the existing physical infrastructure to remedy the unusable section, for example, by repairing the faulty infrastructure or installing additional capacity where the existing capacity is full.

⁴⁴ In paragraph 4.25 of the April 2017 DPA Consultation, we set out examples of where unusable sections of infrastructure will be encountered, based on BT’s own surveys of its physical infrastructure commissioned in 2008 and 2009, as well as more recent surveys carried out by other telecoms providers with a view to using PIA. We set out a number of examples in more detail later in this section, and evidence as to their incidence in Annex 26.

- 2.35 Given the range of options available to Openreach to overcome unusable sections of infrastructure, it will sometimes be more efficient (i.e. quicker, easier and/or cheaper) for Openreach to adjust the existing physical infrastructure than for a telecoms provider to install their own infrastructure alongside BT's. For example, it may cost less for Openreach to repair faulty infrastructure than for a telecoms provider to build new, parallel infrastructure.
- 2.36 Without a requirement on Openreach to adjust the existing physical infrastructure in these cases, telecoms providers deploying rival networks would need to incur additional cost and/or delay building their own infrastructure to overcome unusable sections of BT's physical infrastructure. The deployment of rival networks will therefore entail unnecessary duplication of the physical infrastructure network, and the benefits from sharing BT's existing physical infrastructure will not be fully realised. Ultimately, this will reduce the scope for competitive network investment, and in general the remedy will be less effective.
- 2.37 Moreover, requiring telecoms providers to install their own infrastructure to bypass the unusable sections would not ensure a level playing field with Openreach in those cases where it can overcome unusable sections of infrastructure at lower cost in any competing network deployment of its own (for example, an FTTP deployment). Knowing that Openreach has this competitive advantage could undermine incentives to invest in rival networks in the first place, rendering the PIA remedy ineffective.⁴⁵
- 2.38 Therefore, we remain of the view that the PIA access obligation should extend to requiring Openreach to make adjustments to its network where this is necessary for its physical infrastructure network to be available to telecoms providers for the purpose of deploying their own networks, including making certain adjustments to its network to overcome unusable sections of the physical infrastructure. This will promote network competition by realising greater efficiency benefits from sharing BT's existing physical infrastructure and ensuring a level playing field with Openreach. Without such a requirement, the benefits resulting from other telecoms providers deploying ultrafast networks at scale are unlikely to be realised in full.

The requirement to make adjustments is limited

- 2.39 In the April 2017 DPA Consultation, we considered the approach we should take to specifying the extent of the obligation on Openreach to make adjustments to its network. In line with our proposal, we have decided to maintain the general network access requirement while supplementing this with guidance on where this obligation would apply.
- 2.40 We remain of the view that specifying the precise extent of this obligation in the SMP condition carries a risk of regulatory failure given that what is necessary is likely to depend on the specific circumstances of any case. Although stakeholders generally agreed with

⁴⁵ In its response to the 2017 April DPA Consultation, Openreach said that it does not recognise the source of this competitive advantage. We think it is clear; in some cases, Openreach can choose to adjust its existing physical infrastructure network where it is unusable whereas a rival telecoms provider using BT's physical infrastructure network would have to build their own parallel physical infrastructure.

this, some stakeholders argued that the guidance should be clearer and more explicit about what is covered by the obligation to encourage take-up and reduce the likelihood of disputes. Given the risk of regulatory failure, we do not believe it is appropriate to set prescriptive rules about which types of adjustments are included in the obligation, even in guidance. However, we have refined our guidance to clarify the circumstances in which we think Openreach would be required to make an adjustment.⁴⁶

- 2.41 While our approach allows Openreach some degree of flexibility, we are concerned to ensure that Openreach does not act unreasonably. Therefore, where Openreach refuses a request for network access, it should provide reasons for doing so. Furthermore, if it becomes apparent that this approach is not working, we will reconsider whether it is appropriate to adopt a more prescriptive approach.
- 2.42 In the 2017 April DPA Consultation, we set out proposed guidance on the extent of the network adjustments requirement taking into account the factors set out in section 87(4) of the Act, in particular:
- a) the technical and economic viability (including the viability of other network access products, whether provided by the dominant provider or another person), having regard to the state of market development, of installing and using facilities that would make the proposed network access unnecessary;
 - b) the feasibility of the provision 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);
 - 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.
- 2.43 We considered how these factors might apply to examples to illustrate the situations where we expected the obligation to apply, and situations where it did not.
- 2.44 In refining our guidance, we have set out more clearly the criteria we expect to apply.
- 2.45 In selecting these criteria, we have taken particular account of the first, second and fourth of the 87(4) factors set out above. We consider these factors follow on from our reasons for imposing a PIA obligation. Without access to BT's physical infrastructure network, large-scale network deployment in significant parts of the country is likely to be unviable. As explained above, without an obligation to make network adjustments, the scope for competitive network investment will be reduced. Moreover, our objective in imposing PIA is to unlock the efficiencies arising from sharing existing infrastructure to the greatest

⁴⁶ We note that one stakeholder suggested that Openreach and telecoms providers should agree on a set of scenarios where Openreach would be required to make an adjustment. We consider that BT might agree this (possibly as part of the PIA Reference Offer), particularly once our cost recovery proposals and SLAs/SLGs come into effect (although we do not consider that this is necessary requirement for BT to comply with its obligation to make network adjustments). Flomatik response to the April 2017 DPA Consultation, page 2. In response to our August 2017 DPA consultation, Openreach considered that it will be necessary for the new Reference Offer to specify the applicable range of network adjustments which fall within the scope of PIA. Openreach response to the August 2017 DPA Consultation, paragraph 88iii.

extent possible to help facilitate competitive network investment at scale, and therefore promote effective competition in the long-term. However, in imposing PIA we are concerned that the obligation is appropriately limited and that we do not create incentives to use PIA where this is not necessary.

2.46 Specifically, we consider that the following three criteria should be applied to determine whether a particular network adjustment falls within the scope of the PIA obligation.

- **Is the requested adjustment necessary?** This criterion considers the narrow question of whether an alternative option exists which would render the requested adjustment unnecessary, taking account of the first factor set out in section 87(4) of the Act.
- **Is the requested adjustment feasible?** This criterion considers whether there are barriers that prevent Openreach from being able to make the required adjustment, taking account of the second factor set out in section 87(4) of the Act.
- **Does the requested adjustment improve efficiency?** This criterion considers whether the requested adjustment promotes efficiency and is therefore consistent with our rationale for requiring BT to provide network access in the form of PIA (i.e. to unlock the efficiencies from sharing existing infrastructure). This takes account of the fourth factor set out in section 87(4) of the Act.

2.47 With respect to the third factor set out in section 87(4) of the Act, we take account of this through our approach to cost recovery, set out in Section 4. Specifically, we ensure that Openreach has a fair opportunity to recover the costs of any network adjustments.

2.48 In what follows, we:

- a) explain how we intend to apply the three criteria in determining whether the obligation to make a network adjustment applies; and
- b) consider how this might apply to a number of examples to illustrate the situations where we would expect the obligation applies, and situations where we would expect it not to apply.⁴⁷

The three criteria for determining whether the obligation to make a network adjustment applies

2.49 Before discussing the three criteria we intend to apply to determine the extent of the PIA obligation on Openreach, we think it is helpful in light of stakeholder responses to clarify what we mean by a network adjustment in two respects:

- First, network adjustments involve facilitating access to existing infrastructure, rather than the construction of new infrastructure. The network access obligation requires Openreach to provide access to existing physical infrastructure; it does not require Openreach to construct physical infrastructure on behalf of other telecoms providers. This does not mean that Openreach is never required to construct new physical

⁴⁷ For the avoidance of doubt, these examples are not intended to be exhaustive.

infrastructure assets (e.g. new ducts, chambers or poles), but where it is required to do so, this will be for the purposes of facilitating access to existing physical infrastructure. Therefore, Openreach should not be required to construct new physical infrastructure for rival telecoms providers in geographic locations where it does not already have infrastructure (i.e. outside its network footprint). This amounts to an extension of the infrastructure network rather than making use of existing infrastructure assets and will therefore always fall outside the scope of a network access obligation. Similarly, where additional capacity is required within the existing network footprint, as the amount of additional capacity sought increases relative to the total capacity in that section of the existing infrastructure, the work required to provide that capacity is increasingly likely to resemble the construction of new parallel physical infrastructure, rather than the augmentation of the existing infrastructure.

- Second, network adjustments involve making changes which are permanent. It is sometimes necessary to remove obstructions preventing use of existing infrastructure that is otherwise in good working order, for example, removing silt from ducts, or pumping water out of chambers before being able to deploy and maintain access networks through Openreach's underground physical infrastructure.⁴⁸ Having considered the consultation responses, we agree with Openreach that it is more appropriate to regard the removal of obstructions as ancillary activities associated with the deployment and maintenance of access networks, rather than network adjustments.⁴⁹ This is because activities associated with removing obstructions often need to be undertaken every time cables are to be installed or where a telecoms provider or Openreach needs to access its fibre network as part of on-going maintenance or repair of that fibre. The ability of telecoms providers to remove such obstructions is provided for by virtue of the requirement on BT to provide certain ancillary services, but we do not regard them as network adjustments.⁵⁰ In contrast, we regard network adjustments as involving permanent changes which are required to facilitate access to the physical infrastructure. Generally, this will involve making a permanent change to the physical infrastructure itself, although as we explain below, it may involve the permanent removal of redundant cables or equipment left in the physical infrastructure.⁵¹

2.50 Below, we explain how we intend to apply the three criteria identified above, to determine whether a particular network adjustment falls within the scope of the PIA obligation. We

⁴⁸ Similarly, it is sometimes necessary to cut back trees to access the top of poles and install or maintain dropwires or pole-top equipment.

⁴⁹ Openreach response to the April 2017 DPA Consultation, paragraph 102.

⁵⁰ The practical effect of this is that these ancillary activities are not subject to our decision regarding the recovery of network adjustment costs.

⁵¹ The removal of redundant cables or equipment left in the physical infrastructure by telecoms providers using the infrastructure (including BT), is distinct from changes to BT's active network. The latter is not part of the PIA remedy (although BT can choose to meet its obligations to make network adjustments by making changes to its active network in lieu of making a network adjustment).

consider that these criteria are cumulative i.e. Openreach should only be required to make adjustments where all three criteria are met.

Is the requested adjustment necessary?

- 2.51 In some of the cases where a telecoms provider encounters an unusable section of physical infrastructure, an alternative option still using BT's physical infrastructure may exist which would enable the telecoms provider to deploy its access network without an adjustment to the physical infrastructure being made. Provided these alternatives allow for a reasonably equivalent outcome for the telecoms provider compared to making an adjustment, Openreach is unlikely to be under an obligation to remedy the unusable section of the physical infrastructure.
- 2.52 For example, in the case of an unusable section of duct, an alternative duct route might exist; or in the case of an unusable chamber, an alternative chamber might be available with space to accommodate the equipment. Provided these alternatives allow the telecoms provider to deploy its network to the same end customer premises, and any additional cost incurred by the telecoms provider is not disproportionate⁵², Openreach is unlikely to be under an obligation to remedy the unusable section of the physical infrastructure.

Is the requested adjustment feasible?

- 2.53 Adjustments which are infeasible are not required under the network access obligation. In some cases, there may be technical, operational or legal barriers that prevent Openreach from being able to make the required adjustment, for example, wayleave access for the work is not granted⁵³, or planning restrictions are in place.
- 2.54 In some cases, such barriers may not be insurmountable, but the cost involved in overcoming any barriers would be significant. We consider that this is addressed by the third factor discussed below (i.e. whether the adjustment is efficient).

Does the requested adjustment improve efficiency?

- 2.55 We consider that Openreach should only be required to make adjustments where this improves efficiency (i.e. it is quicker, easier and/or cheaper for Openreach to adjust the existing physical infrastructure than for a telecoms provider to install its own infrastructure alongside BT's). This is consistent with our rationale for requiring BT to provide network access in the form of PIA. We want to encourage infrastructure sharing when it is more efficient than the other options available to a telecoms provider, such as building its own physical infrastructure, as these efficiencies will facilitate investment which would not otherwise be viable.

⁵² For example, a telecoms provider may incur additional costs associated with longer lengths of fibre, or higher rental charges associated with longer lengths of duct. In assessing whether the additional cost is disproportionate, we would consider how any cost difference compares to the cost of undertaking the requested adjustment.

⁵³ We note that Openreach considered that wayleaves would not be a significant limiting factor, as the majority of Openreach's network is located in the public highway. Openreach response to the April 2017 DPA Consultation, paragraph 131.

- 2.56 If telecoms providers paid the full upfront cost of any network adjustments they requested, as is currently the case, we would expect them to have incentives to request network adjustments only where this was the most efficient way to overcome unusable sections of physical infrastructure. However, for the reasons set out in Section 4, we have decided that Openreach should recover the costs of network adjustments over all users of the physical infrastructure up to a financial limit. We recognise that as a result, telecoms providers may not have the incentive to choose the most efficient solution to overcome unusable sections of physical infrastructure (for example, when choosing between requesting a network adjustment or building their own parallel infrastructure).
- 2.57 Given the risk that telecoms providers request network adjustments which would be inefficient, we consider that Openreach should only be required to make adjustments to its physical infrastructure where this improves efficiency.⁵⁴
- 2.58 We would consider whether this is the case by comparing two scenarios:
- a) Openreach adjusts its physical infrastructure to remedy the unusable section of Openreach’s infrastructure (the “factual” scenario); and
 - b) the telecoms provider builds its own network asset to circumvent the unusable section of Openreach’s infrastructure (the “counterfactual” scenario).
- 2.59 Openreach should only be required to make adjustments where the factual scenario is more efficient than the counterfactual scenario, for example, it is quicker, easier and/or cheaper.⁵⁵
- 2.60 In this comparison, the cost in the factual scenario should be the incremental cost to Openreach of making the adjustment at the telecoms provider’s request. For example, if Openreach would have carried out the work anyway, even if the telecoms provider had not requested the adjustment, the incremental cost will be lower than the cost of the civil works (and in some cases could be zero).⁵⁶
- 2.61 Moreover, the factual and counterfactual scenarios should be based on Openreach’s own engineering practices applicable at the time. This ensures that Openreach cannot refuse requests for network adjustments by requiring competing telecoms providers to choose a

⁵⁴ This reflects our aim in requiring Openreach to make network adjustments, namely, to avoid unnecessary duplication of the physical infrastructure in situations where it is quicker, easier and/or cheaper for Openreach to adjust the infrastructure than for a telecoms provider to install their own infrastructure. We recognise that it might be argued that Openreach should also be required to make network adjustments in situations where the adjustment is as efficient as the telecoms provider installing its own infrastructure, on the basis that this would promote greater network competition (as the costs of these additional adjustments would be recovered across all users of the infrastructure under our approach to cost recovery) and would still ensure telecoms providers cannot request network adjustments which would be inefficient. However, at this stage, we are not persuaded that such an obligation is necessary to ensure effective competition in the long term, or proportionate given our current understanding of the benefits and risks. For the avoidance of doubt, our approach does not prevent Openreach from choosing to undertake a broader set of network adjustments than required under the network access obligation, provided it treats all telecoms providers including BT in the same way (unless differences can be justified).

⁵⁵ We note that time and difficulty (or operational complexity) can be thought of as drivers of additional costs.

⁵⁶ For example, Openreach have an ongoing pole testing programme. Any pole which requires non-urgent replacement is added to a central workstack which is then cleared by suppliers in the following financial year. Openreach response to question 10 of the WLA s.135 notice issued on 12 October 2017.

lower cost engineering solution that it would not choose for itself. This approach will also provide greater certainty to Openreach and competing telecoms providers in cases where a range of engineering solutions might exist.

- 2.62 We recognise that it might be argued that even in cases where it is more efficient for Openreach to make an adjustment than for the telecoms provider to build its own network asset, the costs involved in making the adjustment outweigh the benefits of making of the adjustment (i.e. so the adjustment could still be considered inefficient). At the level of individual network adjustments, we think a comparison of the costs and benefits is unlikely to be a meaningful exercise. This is because the benefits of making network adjustments – i.e. more fully realising the efficiency benefits of sharing the existing infrastructure, thereby increasing the scope for competitive network investment – arise from the cumulative impact of multiple adjustments, rather than an individual network adjustment. We consider that the risks of the costs outweighing the benefits should be assessed at the overall level of whether the entry of a competing network provider is efficient, and address this in Section 4.

Illustrative examples of whether the obligation to make a network adjustment applies

- 2.63 The extent to which an adjustment falls within the scope of the PIA obligation will depend on the application of the factors set out above to the relevant facts. However, in order to provide certainty to Openreach and potential investors about the likely extent of the network access obligation, we consider below how these three factors might apply to a number of examples. These illustrate the situations where we would expect the obligation applies, and situations where it is not expected to apply.

- 2.64 We consider the following non-exhaustive examples:

Issues with spine duct and chambers

- Capacity constrained spine duct
- Capacity constrained chambers
- Collapsed spine duct
- Directly buried sections within the existing network footprint

Issues with underground lead-ins

- Capacity pinch-points in spine duct which connect to lead-in duct
- Collapsed underground lead-in duct
- Capacity constrained lead-in duct

Issues with poles

- Capacity constrained poles
- Defective poles

Capacity constrained spine duct

- 2.65 In cases where spine duct between two chambers is capacity constrained, and there are no alternatives available that would mean installing additional capacity was unnecessary (for

example, alternative routes), there are two potential ways additional capacity could be provided: removing redundant cables or installing a new section of duct between the chambers.

- 2.66 If there are redundant cables occupying the space but serving no useful purpose in the provision of services either now or in the foreseeable future, Openreach may be able to remove these to release existing capacity. We recognise that not all redundant cables can be removed, for example, if there is a significant risk of damage to adjacent live cables installed in the same duct or the integrity of the duct. However, where this is feasible, this is likely to be more efficient than the telecoms provider installing its own section of duct between the chambers, and so Openreach would be required to make such an adjustment.
- 2.67 If removing redundant cables is not a feasible option, the only way to provide additional capacity would be to build a new section of duct between the chambers. We consider that a telecoms provider is likely to be able to install its own duct broadly as efficiently as Openreach could and so this is unlikely to be a required adjustment.
- 2.68 Our position reflects the following refinements to the thinking set out in paragraph 4.28 of the April 2017 DPA Consultation:
- a) We previously said that Openreach is likely to be able to install new duct at lower cost than a telecoms provider can build parallel infrastructure, on the basis that when a telecoms provider installs parallel duct to bypass congested sections, engineering best practice requires the installation of chambers at either end of the duct runs. The building of additional chambers makes this approach more expensive than Openreach providing ducts which would be connected directly to the existing chambers. We now understand that telecoms providers can install their own sections of duct directly between Openreach's chambers.⁵⁷
 - b) We previously considered that telecoms providers maintaining short sections of non-contiguous infrastructure may face higher costs and coordination issues with Openreach, than if it were part of a national infrastructure network. We also considered that the opportunity to further monetise any unused capacity in these short sections of infrastructure, by providing access to other telecoms providers, is also likely to be limited. On reflection, we do not expect these considerations to be sufficiently material to justify requiring Openreach to install new duct capacity. This is because we understand that telecoms providers are generally content with hybrid network designs. Indeed, we expect most deployments to be hybrid designs.⁵⁸
 - c) We previously said that the length and amount of additional duct capacity required were likely to be relevant factors in assessing what Openreach should be required to

⁵⁷ Openreach stated that telecoms providers would not be required to install chambers at either end of the duct but could break into an existing Openreach chamber Openreach response to the April 2017 DPA Consultation, paragraph 128. Telecoms providers are unable to break into an existing Openreach chambers in areas classified as sensitive/secure. Openreach response to question 1a of the WLA s.135 notice issued on 12 October 2017.

⁵⁸ Stakeholder [3<] responses to question 2b of the WLA s.135 notice issued on 8 November 2017.

provide. Given our view that a telecoms provider is likely to be able to install its own duct broadly as efficiently as Openreach could, these factors are less relevant.

Capacity constrained chambers

2.69 There are two possible reasons why chambers may be capacity constrained:

- a) insufficient space to accommodate extra equipment (e.g. fibre splitters); and
- b) insufficient space on the end wall to accommodate another duct bore (as explained above, our assumption that a telecoms provider can install new spine duct between Openreach chambers as efficiently as Openreach relies on the telecoms provider having access to a chamber end wall).

2.70 Where there are no alternative options to installing additional chamber capacity (for example, relocating to another chamber), there are various potential ways additional capacity could be provided: removing redundant cables or equipment, enlarging the existing chamber, or installing a new chamber adjacent to the existing chamber.⁵⁹

2.71 As above, if there are redundant cables or equipment occupying the space but serving no useful purpose in the provision of services either now or in the foreseeable future, it may be possible to remove these to release existing capacity. Where this is feasible, this is likely to be more efficient than the telecoms provider installing a new chamber, and so Openreach would be required to make such an adjustment.

2.72 If removing redundant cables or equipment is not a feasible option, Openreach may be able to enlarge the existing chamber. This will often be more efficient than a telecoms provider installing its own chamber adjacent to the existing chamber and linking the two. Although the cost to Openreach of enlarging the existing chamber may be similar to the cost incurred by the telecoms provider installing a new chamber, the telecoms provider will also have to install additional ducts to link the two chambers. Moreover, it may not be possible for the telecoms provider to locate a new chamber directly adjacent to the existing one, potentially making it even more costly (for example, requiring works on the carriageway rather than the footway) or more complex (for example, in terms of accessing the duct routes coming out of the existing chamber or installing an additional duct bore). Therefore, when it is feasible for Openreach to enlarge the existing chamber, it is likely that Openreach will be required to do this in most cases (although we recognise that there may be cases where Openreach enlarging the existing chamber and the telecoms provider installing its own chamber are similar in terms of their efficiency).

2.73 In some cases, it will not be feasible for Openreach to enlarge the existing chamber, for example, if there is insufficient space to accommodate a larger chamber. In these cases, the only option available to Openreach will be the installation of a new chamber adjacent to the existing chamber. We consider that a telecoms provider is likely to be able to install

⁵⁹ We note that relocating to another chamber or removing redundant cables or equipment may not address the issue of insufficient space on the end wall to accommodate another duct bore.

a new chamber as efficiently as Openreach could and so it is unlikely that Openreach would be required to do this.

Collapsed spine duct

- 2.74 In cases where spine duct is unusable because it has collapsed, and there are no alternatives available that would make a network adjustment unnecessary (for example, alternative routes), it is likely that it would be more efficient for Openreach to repair the spine duct than for the telecoms provider to install its own section of spine duct between the two chambers to circumvent the collapse. This is because repairing a collapsed duct is likely to require less digging than installing a new section of duct between the two chambers, since digging is only required at the location of the collapse. Therefore, provided the repair is feasible, it is likely that Openreach would be required to repair collapsed spine duct.
- 2.75 Where multiple repairs are required in a short section of duct, we recognise that it may be more efficient to install a completely new section of duct between the two chambers, rather than undertake multiple repairs, especially where the number of repairs required is uncertain.⁶⁰ In this situation, the telecoms provider would be equally well placed to install the new section of duct, and so it is unlikely Openreach would be required to undertake these repairs.

Directly buried sections within the existing network footprint

- 2.76 In some parts of the Openreach network, cables are directly buried in the ground between chambers. Although the installation of duct between the chambers might be considered necessary to facilitate use of the existing chambers, a telecoms provider is likely to be able to install its own duct between the chambers broadly as efficiently as Openreach could, so this is unlikely to be a required adjustment.

Capacity pinch-points in spine duct which connects to lead-in duct

- 2.77 In some places, lead-in ducts are connected to spine duct running down the street with a 'swept-tee' joint or connected to ducts using small footway boxes. To make use of the lead-in ducts, telecoms providers must be able to access the spine duct to which lead-in ducts are connected. In both scenarios, a pinch-point can occur at, or close to Openreach's distribution point where Openreach's copper lead-in cables converge. Depending on the number of premises served and the number and size of any other cables in the spine duct, there may be insufficient capacity in the spine duct at the chamber where Openreach's distribution point is located to accommodate a second set of lead-in cables for a fibre network. If this is the case, it will be necessary to overcome this pinch point to access the lead-in ducts.

⁶⁰ Where two blockages are identified in a duct section (by rodding from each end of the duct), it is not possible to tell whether there are additional blockages between the two identified blockages. We understand from Openreach that the current process for deciding whether to repair the existing duct or install a new duct section is informal, with the civil contractor speaking to the relevant planner for the job, who will then make an assessment. This process will need formalising.

- 2.78 One way in which Openreach could relieve the congestion is by adding footway boxes along the spine duct so that the congested sections of duct can be bypassed and the lead-ins accessed. Alternatively, the telecoms provider could build its own infrastructure from the distribution point (i.e. build its own spine duct and lead-in ducts, or something equivalent). This is likely to involve significantly more cost, time and operational complexity than Openreach installing footway boxes. Therefore, we think that Openreach is likely to be required to relieve capacity pinch-points in spine duct which connects to lead-in duct, for example, by installing footway boxes along the spine duct. This is subject to the adjustment being feasible.

Collapsed underground lead-in duct

- 2.79 Where lead-in ducts have sufficient capacity to deploy an additional cable but have collapsed, we understand that it is not always economic to repair the existing duct, and installing a new lead-in duct is a more efficient solution. For example, where lead-in ducts are short (i.e. where the property is close to the public highway) it is likely that installing a new lead-in duct alongside may be comparable or possibly superior in terms of time, cost and operational complexity. Conversely, where lead-in ducts are long (i.e. where the property is situated well back from the public highway), repairing the duct is likely to be superior in terms of time, cost and operational complexity.
- 2.80 The alternative to Openreach making an adjustment (i.e. repairing or installing a new lead-in duct) is for the telecoms provider to install its own lead-in duct.
- 2.81 Where repairing the existing lead-in duct is the superior option for Openreach, it is likely to be more efficient for Openreach to repair the existing lead-in duct than for the telecoms provider to install its own lead-in duct. Where this is the case, it is likely that Openreach would be required to do this (provided this is feasible). We note however that competing telecoms providers may prefer to adopt their own lead-in solution rather than request a repair to the existing lead-in duct.⁶¹
- 2.82 Where installing a new lead-in duct is the superior option for Openreach, a telecoms provider is likely to be able to do this as efficiently as Openreach could. This relies on the telecoms provider being able to join the new lead-in duct to Openreach's duct at a suitable point, for example, the existing lead-in duct or the spine duct passing the property and leading back to the distribution point.⁶² Where this is the case, Openreach is unlikely to be required to install a new lead-in duct or repair the existing lead-in duct.

⁶¹ We understand that some competing telecoms providers adopt quicker, lower cost solutions to installing lead-ins than Openreach, or solutions which provide greater certainty over the customer connection process. Openreach's engineering rules require lead-ins to be buried in duct at a certain depth all the way to the edge of the property, but some customers may be reluctant to grant permission to install an underground lead-in where this is likely to result in damage to the surface at the front of their property (e.g. block paving). We understand that some telecoms providers prefer to run the lead-in in sub-duct above, or just below the surface.

⁶² We recognise that in some cases, a telecoms provider may incur additional cost connecting to Openreach's duct, for example, if a footway box needs to be installed. However, as noted above, we also understand that some competing telecoms providers adopt lower cost solutions to installing lead-ins than Openreach, such that the overall cost could still be lower.

- 2.83 In response to the April 2017 DPA Consultation, Virgin Media noted that it may not be simple for a telecoms provider to install its own lead-in duct where this is not wholly within the boundary of the premises being connected, but also runs under third-party private property or in the public highway. In our view, any difficulties form part of the comparison of whether a network adjustment increases efficiency. In the extreme, if a telecoms provider faces insurmountable barriers preventing it from being able to install its own lead-in, it is more likely that Openreach would be required to make an adjustment.

Capacity constrained lead-in duct

- 2.84 We understand that most homes in the UK are served via overhead lead-ins or ducted lead-ins where there is sufficient capacity for at least some additional fibre.⁶³ However, some homes are served by underground lead-ins which are too small to accommodate an additional cable.
- 2.85 Additional capacity can be provided by installing a new underground lead-in duct. As explained above, a telecoms provider is likely to be able to do this broadly as efficiently as Openreach could. Where this is the case, Openreach is unlikely to be required to install a new lead-in duct.

Capacity constrained poles

- 2.86 In cases where an existing pole is capacity constrained, and there are no alternatives available (for example, using another pole nearby), it will be necessary to increase capacity on the pole. There are several options available for Openreach to increase capacity, including installing a larger/stronger pole or, in some cases, strengthening the existing pole.⁶⁴ Alternatively, Openreach could release existing capacity by removing existing copper dropwires where the connection is not active. It might also choose to replace existing copper dropwires with hybrid copper-fibre/micro-tube dropwires, although Openreach would not be required to do this under PIA.
- 2.87 We consider it very likely that Openreach will be able to provide additional capacity on poles more efficiently than a competing telecoms provider which would likely need to build parallel infrastructure. The alternatives available to competing telecoms providers include installing their own pole (although this may face opposition from residents, and physical limitations due to crossing wires fouling each other), or the more costly alternative,

⁶³ Around 50% of UK homes have overhead lead-ins in the form of dropwires attached to the home from poles, while the rest have underground lead-ins, either through ducts or as directly buried cable. BT has previously told us that it estimates that between 5% to 10% of lead-ins may be served by cables that are directly buried in the ground without ducts. For ducted lead-ins, we understand that most of these are 50mm diameter ducts and the majority (80%) of the cables in the 50mm lead-in duct are less than 15mm in diameter, leaving significant space within the duct. Smaller 25mm ducts may also be present in some parts of the BT network deployed before 1968, with little unoccupied capacity for additional cables. 2010 WLA market review consultation, paragraph 7.128 and Sample survey of ducts and poles in the UK access network, Analysys Mason, pages 1 to 3. https://www.ofcom.org.uk/data/assets/pdf_file/0023/33971/duct_pole.pdf. In its response to our information request of 6 March 2017, BT has confirmed that it does not know the total number of directly buried lead-ins, but provided a rough estimate that approx. 5% of lead-ins may be directly-buried. This varies by region, between 1% in London and 8-10% in Southern England.

⁶⁴ Openreach noted that adding a stay to a pole does not necessarily add capacity. Openreach response to the April 2017 DPA Consultation, paragraph 131.

installing ducts for underground lead-ins. These alternatives are likely to be far more costly than the much lower cost and lower risk options available to Openreach, particularly if Openreach chooses an option which makes use of the existing pole. It is also likely that at least one of the options available to Openreach will be feasible. Therefore, adjustments to provide additional capacity on poles are likely to be required.

Defective poles

- 2.88 Where poles have capacity, but cannot be used because they are defective⁶⁵ and there are no alternatives available that would make a network adjustment unnecessary (for example using another pole nearby), it is very likely that it would be more efficient for Openreach to repair or replace the existing pole than for a competing telecoms provider to build parallel infrastructure. In addition to the reasons set out above, we understand that Openreach will repair or replace defective poles as a matter of course anyway, and therefore the incremental cost of the repair or replacement, required as part of providing network access, is considerably lower than the actual cost incurred by Openreach.⁶⁶ Therefore, pole repairs and replacement are likely to be required.

Openreach should choose how to undertake network adjustments

- 2.89 We remain of the view that where an adjustment is necessary for Openreach's physical infrastructure network to be available to telecoms providers for the purpose of deploying their own networks, Openreach should be able to choose the form of adjustment it makes to meet its obligation. This provides Openreach with the flexibility to choose the most efficient solution possible, and allows it to take account of its own future requirements.
- 2.90 Notwithstanding the benefits of giving Openreach flexibility, it is important that Openreach is not able to exploit this flexibility to undermine the effectiveness of the remedy. We consider that our broader proposals prevent Openreach from doing this in the following ways:
- a) The non-discrimination requirements we are imposing on BT prevent Openreach from applying a different approach for external PIA users to the approach taken for its own network deployments unless such a difference can be justified (see Section 3);
 - b) The requirement to produce a Reference Offer includes a requirement to set out the terms and conditions on which other providers may purchase PIA and access BT's infrastructure (see Section 6);
 - c) Our decision on how BT should recover the costs of making any adjustments provide Openreach with the incentive to select the most efficient approach and limit the

⁶⁵ For the avoidance of doubt, we are referring here to poles which cannot be used, rather than poles that are unclimbable but can be accessed and used (e.g. via using a raised platform). We discuss this further in Section 6.

⁶⁶ Openreach have an ongoing pole testing programme. Any pole which requires non-urgent replacement is added to a central workstack which is then cleared by suppliers in the following financial year. Openreach response to question 10 of the WLA s.135 notice issued on 12 October 2017.

incentive to select high cost solutions to increase a competing telecoms provider's costs of deployment (see Section 4).

- 2.91 In response to the April 2017 DPA Consultation, Openreach noted that some network adjustments may be just as easily carried out by the telecoms provider.⁶⁷ For the avoidance of doubt, our guidance sets out where a network adjustment is likely to be required. If an adjustment falls within the scope of the access obligation, although the responsibility for the adjustment rests with Openreach, it may meet this requirement by agreeing with industry arrangements for the telecoms provider to undertake the works itself (effectively on behalf of Openreach).⁶⁸

Breaking in and out of Openreach's physical infrastructure

- 2.92 Telecoms providers are likely to deploy hybrid networks, using a mixture of Openreach's infrastructure and their own infrastructure.⁶⁹ Therefore, to make effective use of Openreach's physical infrastructure, telecoms providers need to be able to break in and out of the infrastructure to interconnect with their own infrastructure.⁷⁰ In addition, in some of the illustrative examples set out above, the ability of telecoms providers to overcome unusable sections of Openreach's physical infrastructure as efficiently as Openreach depends on the ability to break in and out of Openreach's physical infrastructure at particular points.⁷¹
- 2.93 For the avoidance of doubt, the ability of telecoms providers to break in and out of the infrastructure is provided for by virtue of the requirement on BT to provide certain ancillary services, but we do not regard breaking in and out of the network as network adjustments on the basis that these are for the purpose of enabling hybrid networks rather than making Openreach's network ready for use.⁷²

⁶⁷ For example, see Openreach response to the April 2017 DPA Consultation, paragraphs 129, 136.

⁶⁸ As network adjustments are made to Openreach's physical infrastructure, Openreach will retain ownership of the relevant assets.

⁶⁹ We expect most deployments to be hybrid designs. Stakeholder [X] responses to question 2b of the WLA s.135 notice issued on 8 November 2017.

⁷⁰ For example, telecoms providers may want to break in and out of Openreach's physical infrastructure on the side-wall of Openreach chambers, to interconnect with their own network (as they can already). Similarly, where a telecoms provider does not plan to use Openreach's underground lead-ins – either because the underground lead-ins are known to be unusable due to lack of space or damage, or because there is not sufficient certainty with regards to connecting the customer – the telecoms provider may want to break out of the Openreach network at various points. For example, telecoms providers may want to break out from the chamber where the underground distribution point is located (as they can already); break out from the spine duct running down the street using a swept-tee joint; or break out from the lead-in at the boundary wall using a swept-tee / or Y shaped joint. This latter solution was put forward by Virgin Media – to break out of the lead-in at the boundary wall and install their own toby box adjacent to the lead-in. In principle this could avoid interfering with Openreach's cabling activities from the end-users' premises back to their distribution point, but we acknowledge that such a solution might need testing. See non-confidential 'Supplementary Note on PIA', sent by Virgin Media to Ofcom on the 10 October 2017.

⁷¹ For example, the ability to install duct directly between Openreach's chambers requires that they can break out of the end walls of Openreach's chambers (i.e. in the direction of the duct run).

⁷² The practical effect of this is that these ancillary activities are not subject to our decision regarding the recovery of network adjustment costs.

Scope of PIA

- 2.94 In this sub-section, we consider the scope of the PIA remedy and the precise form of network access obligation we should impose. In particular, we set out:
- the circumstances in which the PIA remedy can be used to supply non-broadband services⁷³ such as symmetric point-to-point leased lines;
 - the geographic scope of the PIA remedy; and
 - our views on how the revised scope of PIA will work in practice.
- 2.95 The PIA remedy is currently limited to the deployment of broadband access networks serving multiple premises. Although this does allow for the deployment to both businesses and residential customers, it precludes symmetric-speed point-to-point leased lines (typically used to support the needs of large businesses).⁷⁴ Additionally, the current PIA remedy is limited in its use to local access deployments.⁷⁵
- 2.96 We now consider the precise form of network access obligation we should impose.

Our proposals

- 2.97 In the April 2017 DPA Consultation, our provisional view was that it is appropriate to relax the current PIA usage restriction to allow ‘mixed usage’. This would allow PIA to be used to deploy local access networks offering both broadband and non-broadband services provided the purpose of the network deployment is primarily the delivery of broadband services to homes and businesses, and provided this mixed use enables the investment in the provision of broadband services more generally.
- 2.98 We considered that unless the current usage restriction is relaxed or removed, the PIA remedy would not achieve our aim of encouraging deployment of rival networks at scale with a view to addressing the competition problems we have identified in the WLA market. This was because the current usage restriction prevents telecoms providers from (i) designing their networks flexibly in a way that enables them to innovate and respond promptly to changes in technology and customer needs; and (ii) realising the economies of scope in deploying and providing multiple services on a single network. We considered that as a result, the current usage restriction materially increases the risk that telecoms providers may take the view that it is not viable to invest in the first place, undermining the effectiveness of the PIA remedy as a basis for scale rollout of competing networks.
- 2.99 We explained that when considering the form of network access obligations generally, our starting point would be not to impose any restrictions on use or scope, which in most

⁷³ By non-broadband service, we mean services that are not part of the WLA market, nor downstream from the WLA market.

⁷⁴ The scope of the current PIA remedy is limited to use “for the purposes of deployment of broadband access networks serving multiple premises”. See the FAMR Statement 2014, Annex 29, Condition 2.1A.

https://www.ofcom.org.uk/data/assets/pdf_file/0033/78837/annex_29.pdf.

⁷⁵ PIA is limited to network access to “the Dominant Provider’s Physical Infrastructure located between Network Termination Points and Local Access Nodes serving those Network Termination Points”, as outlined in the FAMR Statement 2014, Annex 29, page 22.

instances are unnecessary. Usage restrictions may also raise the risk of regulatory failure, such as limiting flexibility and technology choices. However, we were concerned that in the absence of usage restrictions, there would be a risk that some telecoms providers might use PIA only to build a limited number of high value point-to-point leased lines connections. Since such services are not part of the WLA market, nor downstream from the WLA market, we considered that this would not promote greater network competition in accordance with our aims, and would not be consistent with PIA as a remedy in the WLA market. Therefore, our provisional view was that it is necessary to impose some form of mixed usage restriction on PIA to make the remedy effective.

- 2.100 In terms of what form of mixed usage restriction is appropriate, we considered both a ‘specific’ and ‘generic’ rule. We said that while a specific rule affords telecoms providers additional certainty compared to a generic rule, the benefits of certainty are likely to be outweighed by the risk of regulatory failure. We considered that a generic mixed usage rule was likely to be effective.
- 2.101 We also proposed to modify the PIA condition to broaden the geographic scope of usage by defining the geographic scope by reference to telecoms providers’ local access networks rather than BT’s network. Providers would be permitted to use PIA between network termination points (i.e. customers’ premises) and their local access node serving those network termination points.
- 2.102 In the April 2017 DPA Consultation we also set out our views on how our proposals on the scope of PIA would work in practice. In particular, we set out five features of telecoms providers’ deployment that appear relevant to consideration of whether a particular request for network access is consistent with our proposed mixed usage and geographic scope rules. We further noted that in the event of any dispute, we would expect to consider these features by looking holistically at the network deployment in the local access area.

Stakeholder responses

- 2.103 In response to the 2016 PIA Consultation, there was significant support from stakeholders to broaden the scope of PIA to include leased lines, with these stakeholders citing reasons such as avoiding the duplication of infrastructure, equivalence with BT and greater certainty of investment. Openreach and Virgin Media disagreed and did not support broadening the scope of PIA.⁷⁶
- 2.104 Stakeholders that responded to the April 2017 DPA Consultation broadly maintained their position on whether to relax usage restrictions:

⁷⁶ See April 2017 DPA Consultation, Annex 6.

- a) Most stakeholders continued to support relaxation of usage restrictions. Some stakeholders, including Vodafone⁷⁷, [3<] ⁷⁸ and TalkTalk⁷⁹, welcomed our proposed approach to implement a mixed usage rule. Some stakeholders, such as CityFibre⁸⁰, the PAG⁸¹, Zayo⁸², and Colt⁸³, disagreed with imposing any type of restrictions on usage.
 - b) Openreach disagreed that extending the scope of PIA remedy to allow mixed use is necessary.⁸⁴ It argued that the current form of PIA allows the deployment of full-fibre networks.⁸⁵ It claimed that we had not provided evidence that PIA would be more effective if usage is extended beyond NGA to allow the provision of leased lines.⁸⁶ Openreach also expressed concerns that the mixed usage rule encroaches on regulation imposed on business connectivity services as part of the Business Connectivity Market Review (BCMR), and considered that we had not fully assessed the impact of our proposals on the business connectivity market.⁸⁷
- 2.105 Our proposal to broaden the geographic scope of PIA was welcomed by Callflow, CityFibre, Flomatik, Hyperoptic, the PAG, SSE, TalkTalk, Virgin Media and Vodafone. These stakeholders highlighted the potential benefits from not restricting other network providers to following BT's network topology. While Openreach said it did not fundamentally object to our proposal on geographic scope, it said we need to specify the remedy to mitigate the risk of telecoms providers using it to build backhaul and core networks. Zayo and INCA said our geographic scope proposal was too restrictive, arguing that the need to aggregate traffic locally when building modern fibre networks has diminished, and that most of the network will effectively constitute backhaul.
- 2.106 Various stakeholders said adequate guidance on the operation of the remedy and the usage restrictions is needed to provide clarity and transparency, and to avoid the risk of multiple disputes. CityFibre said the brief statements in the April 2017 DPA Consultation left too much discretion for Openreach. The PAG took a similar view and it also said the guidance could be improved by giving it clear legal force. Sky called for a clearer definition of mixed usage, to prevent Openreach from withholding access or other providers from 'gaming' the rules. SSE and O2 also sought more clarity on mixed usage to avoid the evolution of regulation via dispute and/or to avoid deterring investment in PIA.
- 2.107 In relation to process, O2 and TalkTalk said there are many circumstances where disagreements could arise between Openreach and access seekers. TalkTalk said a proactive, bespoke process for monitoring compliance with the rules should be

⁷⁷ Vodafone response to the April 2017 DPA Consultation, paragraph 3.

⁷⁸ [3<] response to the April 2017 DPA Consultation, paragraph A5.9.

⁷⁹ TalkTalk response to the April 2017 DPA Consultation, paragraph 3.8.

⁸⁰ CityFibre response to the April 2017 DPA Consultation, paragraph 12.2.6.

⁸¹ The PAG response to the April 2017 DPA Consultation, paragraph 13.

⁸² Zayo response to the April 2017 DPA Consultation, page 2.

⁸³ Colt response to the April 2017 DPA Consultation, page 1.

⁸⁴ Openreach response to the April 2017 DPA Consultation, paragraph 163. Openreach agreed with our view that we should not impose an unrestricted PIA remedy.

⁸⁵ Openreach response to the April 2017 DPA Consultation, paragraph 167.

⁸⁶ Openreach response to the April 2017 DPA Consultation, paragraph 163.

⁸⁷ Openreach response to the April 2017 DPA Consultation, paragraph 91.

established. The PAG said that Ofcom, not Openreach, should have responsibility for monitoring and enforcing the mixed usage rule. Alternatively, it proposed that the OTA, or another appropriate independent body should be required to do this.

- 2.108 The confidentiality of information that might be requested by Openreach was raised by stakeholders. CityFibre said robust controls are needed on the sharing of confidential information from other providers within Openreach. INCA also anticipated that the guidance would lead to Openreach requiring the provision of commercially confidential material. Zayo argued that our proposed usage restrictions were unworkable in practice for this reason.
- 2.109 Openreach said the practicalities of assessing multiple orders should not be underestimated and it called for further controls on the mixed usage rule. It claimed it will have very little control and ability to assess how telecoms providers are using PIA and when it would be reasonable to refuse or accept such orders. It also called for disincentives to prevent telecoms providers from gaming the mixed usage rule.

Our reasoning and decisions

- 2.110 When considering the form of our proposed network access obligation, our starting point is to consider imposing a network access obligation without any restrictions on use or scope.⁸⁸ In most instances where we impose network access obligations, such restrictions are unnecessary as the obligations are typically not expected to result in effects on products in other markets. In addition, restrictions present a risk of regulatory failure as they may limit a telecoms providers' flexibility to use the remedy in ways not foreseen by the regulator but nevertheless consistent with the intended purpose of the remedy, which may reduce the effectiveness of the remedy. Therefore, in most cases, imposing an unrestricted network access obligation is both appropriate and proportionate. For example, the LLU and VULA obligations we are imposing in this market review have no such usage restrictions.⁸⁹
- 2.111 However, to a greater extent than other forms of network access, unrestricted PIA could be used as an upstream input into several downstream products, some of which are in markets that are not downstream of the WLA market. For example, PIA could be used to supply both leased line services and broadband access services to multiple premises.

⁸⁸ In its response to the 2016 PIA Consultation, at page 27, the PAG consider it is unclear whether usage restrictions at all are lawful and consistent with the Common Regulatory Framework. We disagree. Article 8 of the Access Directive clearly requires that regulatory obligations, including network access obligations imposed under Article 12, must be based on the nature of the problem identified, proportionate and justified in light of the objectives laid down in Article 8 of the Framework Directive. The PAG appears to be suggesting that once a National Regulatory Authority decides to impose a network access obligation, it must impose an unrestricted form in all circumstances. This is clearly inconsistent with Article 8 of the Access Directive. The PAG also question whether usage restrictions are permissible under Competition Law. To the extent that the PAG is suggesting that imposing a usage restriction would be an abuse of dominance contrary to Article 102 TFEU, we disagree.

⁸⁹ Local loop unbundling (LLU) enables telecoms providers to take control of BT's physical telephone lines so that they can provide services direct to end customers. Virtual Unbundled Local Access (VULA) is used to deliver superfast broadband over BT's FTTC network.

- 2.112 Given our understanding of the likely market dynamics, we are concerned that in the absence of any restrictions, there is a risk that some telecoms providers might use PIA only to build a limited number of high value point-to-point leased lines connections. Since such services are not part of the WLA market, or downstream from the WLA market, this would not promote greater network competition in accordance with our aims, and would not be consistent with PIA as a remedy in the WLA market. The risks are sufficiently large that it would be inappropriate to impose an unrestricted PIA obligation where it is possible to impose some restrictions to ensure that the PIA remedy is sufficiently limited to addressing BT's market power in the WLA market, while still being effective.
- 2.113 It was for this reason that in 2010 and 2014 the imposition of a PIA remedy included a usage and geographic restriction. Specifically:
- a) Allowed usage: the usage of PIA was limited to the deployment of broadband access networks serving multiple premises. Usage of PIA to deploy leased lines and backhaul was therefore not permitted.
 - b) Geographic scope: the remedy was defined so as to limit the use of PIA to local access deployments, and exclude backhaul or core network infrastructure.
- 2.114 As explained below, we consider that these restrictions in their current form undermine the effectiveness of the PIA remedy and that it is necessary to relax restrictions on usage and geographic scope to address our competition concerns. We also set out our decision on what restrictions are necessary to ensure that the PIA remedy is sufficiently limited to addressing BT's market power in the WLA market, while still being effective.

Usage

- 2.115 In this section, we explain the reasons why we consider that the current restrictions undermine the effectiveness of PIA as a basis for scale rollout of competing networks. The current usage restriction only permits PIA to be used for downstream products, such as broadband and fixed telephone services, which make use of inputs from the WLA market. We consider that this restriction undermines the effectiveness of PIA:
- Limiting technology flexibility reduces a telecoms provider's confidence that it will be able to evolve its network design after initial deployment, constraining its ability to adjust its technology choices and respond to changes in customer needs as the market develops in the future.
 - Limiting the scope of the PIA remedy removes the ability of telecoms providers to exploit the economies of scope possible from deploying and providing multiple services jointly on a single network.
- 2.116 Limiting technology flexibility and limiting the scope of the PIA remedy is likely to materially increase the risk that a telecoms provider may take the view that it is not viable to invest in the first place. For example, a fibre network is costly to build, but once deployed has almost limitless capacity. The commercial business case for the initial investment therefore typically relies on using this capacity to generate as many different revenue streams as possible, through a wide range of different services. Information

received from stakeholders supports this, and suggests the current usage restriction has reduced the viability of their business cases, limiting the extent that investments in ultrafast broadband could be justified. We observe that there has been very limited take-up of PIA since its introduction in 2010. Therefore, in order to be effective, we consider the PIA remedy needs to allow telecoms providers to be able to take full advantage of the technologies available, the density of potential customers, and to achieve sufficient scale and scope.

2.117 We discuss these factors in more detail below.

Technological flexibility to meet future demand

2.118 Building a fibre network is a long-term investment, with the initial investment costs only expected to be fully recovered over a relatively long period of time extending far beyond this review period. For example, stakeholders typically evaluate business cases for mass broadband deployments over periods of around 10 or even 20 years.⁹⁰ Therefore, the commercial business case for the initial investment will likely consider not only the ability to meet today's demand, but also future demand for telecoms services.

2.119 Moreover, the telecommunications sector is fast-moving and dynamic, with continually evolving demand and supply, driven by innovation in technology and end-user services and changes in consumer preferences. By their nature these changes cannot be predicted with certainty.

2.120 Against this backdrop, the current usage restriction creates uncertainty for potential investors about the extent to which a network deployed using PIA will be able to meet the future demand. This is because the restriction limits the flexibility that a telecoms provider has to meet changing demands for services and to evolve its network design after the initial deployment. This is likely to add to the risk associated with the business case for competitive network deployment, potentially undermining the PIA remedy as a viable basis for mass broadband network deployment at scale.

2.121 By way of illustration, historically, broadband connections typically offered contended and asymmetrical access, i.e. bandwidth is shared with other users and download speeds are higher than upload speeds. In contrast, leased lines are symmetric and uncontended, leading to high-quality, dedicated services more suited for use by businesses, government and local authorities, financial and data centres etc. as well as telecoms providers themselves. This distinction is somewhat blurred at present, and it could become less clear where a full-fibre network is rolled out⁹¹:

⁹⁰ For example, in its FTTP cost and revenue modelling, a telecoms provider [3<] considered the net present value across a 20-year period, with a payback period of around 9 years. [3<]; Openreach's FTTP Consultation described the very long payback periods associated with FTTP deployment. Openreach Consultation: Upgrading the Access Network with FTTP, 17 July 2017, page 24.

⁹¹ The PAG considers the distinction between residential and business to be somewhat artificial, stating that the relationship between the two is "complex, multifaceted and involves some degree of potential substitution and complementarity throughout the value chain". The PAG response to the 2016 PIA Consultation, paragraph 73. Zayo considers that business and residential, as well as fixed and mobile, networks are converging. Zayo response to the April 2017 DPA Consultation, page 3.

- a) As data demand grows, small businesses currently using broadband connections may consider switching to a connection which offers equally fast speeds both for uploading and downloading. For example, small businesses may increasingly move their data and applications to cloud-based systems and, therefore, may require high-speed, symmetric connections. These customers may move from services currently thought of as “broadband” towards requiring more of the capabilities currently available from a leased line.
- b) Conversely, as the technology supporting ultrafast services develops, it will become increasingly possible to use ultrafast broadband to provide an alternative to leased lines, at least for users that do not require some of the features typically associated with leased lines, including resilience and security. Therefore, for some customers who currently use leased lines, ultrafast broadband may in future meet their needs.⁹² Consumer survey evidence, collected as part of the May 2015 BCMR Consultation, indicated that while not close enough substitutes to belong in the same market, there is some degree of blurring between leased lines and ultrafast services. For example, responses suggested that for many users of business connectivity services, ‘symmetry’ *per se* is not required, so long as the upload and download bandwidth is sufficient to meet their needs.⁹³ Moreover, while recognising the users tend to overstate their likely or intended actions, 31% of users who had not actively considered NGA in the past said they were likely to consider switching to NGA in the future.⁹⁴

2.122 Given these potential changes in technology and demand, we understand that telecoms providers building networks would want to retain flexibility to meet the specific needs of their customers, for example, to lay fibre in both point-to-point and point-to-multipoint architectures and use different technologies and switch between them.⁹⁵

2.123 As we explain more fully below, the current usage restriction is likely to:

- constrain telecoms providers from being able to respond promptly to changes in demand and supply;
- limit their ability to provide innovative services and, therefore, compete with infrastructure providers such as Openreach and Virgin Media; and
- favour specific technologies and network architectures over others with the risk that regulation, rather than market dynamics, drives technology choices.

2.124 Under the current usage restriction, a PIA-based provider restricted to supplying only broadband services would bear additional risk compared to unrestricted end-to-end

⁹² For example, in November 2016, Openreach announced plans to launch a new FTTP broadband product with guaranteed speeds of up to 1 Gbit/s specifically designed to offer businesses an alternative to leased lines.

<http://www.btplc.com/news/index.htm#/pressreleases/openreach-makes-gigabit-speeds-available-across-the-uks-largest-wholesale-ftp-network-1638866> [accessed 2 February 2018].

⁹³ 2016 BCMR Final Statement, Annex 6, paragraph A6.10.

⁹⁴ 2016 BCMR Final Statement, Annex 6, paragraph A6.32.

⁹⁵ Full-fibre broadband networks are typically deployed by means of passive optical networks (PONs) where each broadband user shares a section of the access connection with other users. They typically require less fibre and optical/electronic equipment than a point-to-point network and make use of optical splitters to create the one-to-many linkages. Passive optical network equipment can be configured to provide services similar to point-to-point services.

competitors. This is caused by the uncertainty over whether the provider can use its network to continue supply customers wishing to switch services, depending on the particular service they switch to. To the extent that business connectivity customers maintain their leased line service and broadband customers switch to a leased line service in the future, a restricted PIA-based provider would be unable to meet this demand using its network and, therefore, would be unable to recover its investment across these customers.

- 2.125 The current usage restriction also means that if customers switch between broadband and non-broadband services, a PIA-based provider would be forced to switch between supplying customers taking broadband over its own network and business connectivity over a leased line rented from Openreach. Operating in this way is less convenient and ultimately more costly and inefficient. In addition, it may increase the risk of losing customers it can no longer serve over its network to another provider with an end-to-end network capable of supplying these services. Consequentially, given the uncertainty of future demand, being restricted to supply only broadband services may add material risk to the business case.
- 2.126 The current usage restriction may also inhibit a potential PIA-based competitor's ability to innovate and use its network to supply services using new technologies, whereas existing end-to-end network providers have complete flexibility to innovate in this way. Looking to the future, as outlined in paragraphs 2.134 to 2.135 below, a ubiquitous full-fibre network which could support the future deployment of small cells, would be restricted from being used for these purposes under the current rule. Uncertainty about the ability to meet future demand and innovate to maximise the return on the initial investment, coupled with the knowledge that the network will be competing on an unlevel playing field against unconstrained rival networks, increases the risk of the investment.
- 2.127 Moreover, imposing restrictions based exclusively on services currently in the market could favour specific technologies and network architectures over others with the risk that regulation, rather than market dynamics, drives technology choices.
- 2.128 The above suggests that deploying a network with technological flexibility is particularly important for a telecoms provider. Without the confidence that it will be able to evolve its network design after initial deployment, and adjust its technology choices as the market develops in the future, there is a material risk that it may take the view that it is not viable to invest in the first place.

Economies of scope

- 2.129 Building a fibre network to provide broadband services involves incurring a significant amount of upfront fixed costs.⁹⁶ Being able to use this network to generate as many

⁹⁶ For example, Virgin Media cited a build cost of about £600 per premises (incl. connection) for Project Lightning (Enders Analysis, February 2015, *Virgin Media Q4 2014 results: Growing and building*). In addition, TalkTalk cited a build cost under £500 per premises in York (TalkTalk, 10 May 2017. *Group Preliminary Results*). Our own estimates suggest that, while PIA enables significant cost savings of deploying an end-to-end fibre network, reducing the average cost per home in some

different revenue streams as possible, through a wide range of different services, will help de-risk and, consequentially, improve the commercial business case for the initial investment.⁹⁷ In particular, the provision of both broadband and non-broadband services gives rise to economies of scope.⁹⁸

- 2.130 Economies of scope exist if there are cost savings from deploying and providing multiple services jointly on a single network, as compared to deploying the same services on separate networks or infrastructure. Such savings typically arise from costs which are common across services and, therefore, need to be incurred to serve either or both broadband and point-to-point leased lines customers. For example, in the local access network, economies of scope are expected to arise from common routes between both point-to-point and point-to-multipoint architectures on the way from the local access node to the customers' premises. Where sections of the network used to supply different services share common infrastructure, such as shared duct routes or fibre cables⁹⁹, the costs associated with deploying fibre in those sections are incurred only once but the fibre can then be used to provide different services.¹⁰⁰
- 2.131 Where a telecoms provider is restricted to supplying only a subset of these downstream services, it will need to recover these common costs¹⁰¹ across a smaller customer base. For example, if a telecoms provider cannot offer point-to-point leased lines on its own network, it will need to spread the costs of building and operating the infrastructure across only broadband customers. In addition, being restricted from supplying particular services limits a telecoms provider's ability to set different prices for different services taking account of willingness to pay. Conversely, if a PIA-based provider were able to supply broadband and non-broadband services, it could recover a greater proportion of costs from the services for which there is a higher willingness to pay.
- 2.132 Submissions from stakeholders suggest that not being able to realise economies of scope reduces the viability of their business cases, limiting the extent that investments in ultrafast broadband networks could be justified. For example:

cases by up to 50%, from around £500 to £250 (excluding lead-ins), the upfront cost of a large-scale network deployment is still significant.

⁹⁷ In modelling the costs and revenues associated with building an FTTP network, a telecoms provider ([redacted]) identified the incremental sources of revenues contingent on the ability to offer point-to-point services over its network, £[redacted]m of this revenue is from "large and medium fixed enterprise data" and £[redacted]m is from "mobile backhaul synergy", which together accounted for around 10-15% ([redacted]) of the total revenue achieved. [redacted].

⁹⁸ We note that a telecoms provider may also be able to realise economies of scale in backhaul if it aggregates the traffic of both broadband and non-broadband customers, compared to serving only a subset of these customers. This is because the fixed cost of backhaul is spread across a greater volume of traffic, reducing the unit cost. However, these economies of scale do not depend on whether the telecoms provider supplies these services using an active or passive input. Consequentially, the current usage restriction does not necessarily prevent a telecoms provider from exploiting these efficiencies.

⁹⁹ Fibre cables typically comprise multiple strands of fibre, which can be used to provide multiple different services.

¹⁰⁰ The PAG considers that efficiencies can be realised "through having a single provisioning process and 'truck roll' to an area, even if the precise ducts used for both broadband and business deployments are not identical", although it did not provide evidence as to the significance of these efficiencies. The PAG response to the April 2017 DPA Consultation, paragraph 33.

¹⁰¹ Namely, costs which would have been common to the provision of different services.

- a) CityFibre considered that for duct and pole access to be an effective remedy, telecoms providers competing with BT “must be able to at least replicate those economies of scope”.¹⁰² CityFibre explained that its internal model for building fibre infrastructure assumes a substantial degree of economy of scope in its design and, therefore, a substantial proportion of costs are shared across services within both the WLA market and the business connectivity market.¹⁰³ Further, CityFibre noted that since it deploys its network for all categories of customers “it makes no sense to make use of DPA for only a sub-set of those customers”.¹⁰⁴
 - b) Vodafone said it serves a number of markets and can achieve “benefits from asset sharing between the infrastructure that supports them”.¹⁰⁵ In the local access area, Vodafone considered this will include, for example, broadband services, leased lines and wireless services (mobile base stations and other wireless points), covering residential, and business customers.¹⁰⁶ Vodafone considered the business case for network build is already challenging, and that artificial constraints to cost recovery and duplication of network resources when serving different customers “hampers investment decisions which are already difficult to show a positive return”.¹⁰⁷
 - c) [3<] considered that it is important for entrants to be able to also realise the economies of scope associated with the access networks of BT and cable. It considered that capturing “all revenue sources in the network footprint is necessary to improve the investment case for new networks”.¹⁰⁸
 - d) The PAG¹⁰⁹ and TalkTalk¹¹⁰ considered that it is important for telecoms providers to be able to exploit the economies of scope that can arise from the provision of broadband and non-broadband services over a single network. Both the PAG and TalkTalk considered that the ability to realise economies of scope will allow telecoms providers to be on a level playing field with and, therefore, compete more effectively with, end-to-end providers.
- 2.133 A telecoms provider seeking to build its own fibre network would, therefore, ideally combine different technologies and architectures to offer as wide a range of services as possible, and the ability to exploit these economies of scope could play a key role in de-risking the business case. We note that Openreach itself recovers its fixed and common costs across a range of downstream services and a large volume of different customers. A competitor unable to do so will be at a competitive disadvantage to Openreach, which could potentially disincentivise investment.¹¹¹ A rival telecoms provider considering

¹⁰² CityFibre response to the 2016 PIA Consultation, page 5.

¹⁰³ CityFibre response to the 2016 PIA Consultation, page 5.

¹⁰⁴ CityFibre response to the 2016 PIA Consultation, page 5.

¹⁰⁵ Vodafone response to the 2016 PIA Consultation, paragraph 25.

¹⁰⁶ Vodafone response to the 2016 PIA Consultation, paragraph 25.

¹⁰⁷ Vodafone response to the 2016 PIA Consultation, paragraph 26.

¹⁰⁸ [3<] response to the 2016 PIA Consultation, paragraph 7.

¹⁰⁹ The PAG response to the 2016 PIA Consultation, page 39.

¹¹⁰ TalkTalk response to the 2016 PIA Consultation, paragraph 5.3.

¹¹¹ Virgin Media also uses its network to supply broadband and leased lines services.

investing in a competing network may be less likely to do so in the knowledge that Openreach has freedom to fully exploit economies of scope arising from the provision of broadband services and non-broadband services, whereas it cannot if it uses PIA.¹¹²

- 2.134 In addition, technological innovation could give rise to further opportunities to exploit economies of scope in the future. For example, small cells appear likely to play an important role in the densification of 4G networks (i.e. adding additional cell sites to increase available 4G capacity) and the delivery of 5G services. This is likely to require a large number of small cells located close to customers' premises and the backhaul required for these cells could have a very high degree of overlap with a mass ultrafast broadband network.¹¹³
- 2.135 This could represent a very significant source of economies of scope for a telecoms provider deploying full-fibre, as it will already have fibre deployed close to the antennae locations. The ability to exploit such opportunities, even if currently uncertain, is likely to be an important factor in a potential entrant's decision of whether to invest in a competing network using PIA. The current usage restriction would prevent telecoms providers which had deployed a full-fibre network using PIA from realising any of the benefits of these economies of scope. Moreover, rival telecoms providers considering investing in a competing network using PIA are unlikely to do so in the knowledge that there is no restriction on Openreach (or other end to end competitors) preventing it from realising these economies of scope.¹¹⁴
- 2.136 Below, we consider:
- a) evidence on the extent of geographic overlap between different types of customers; and
 - b) evidence on the magnitude of the economies of scope.
- 2.137 The magnitude of economies of scope in the local access network largely depends on the geographic overlap between different types of customers, who demand different types of services, i.e. broadband and non-broadband services. We have analysed a number of different sources of evidence and this suggests that there is likely to be geographic overlap

¹¹² Openreach provided a slide pack summarising its current thinking on a potential new architecture for a fibre network - referred to as a 'single fibre network' - which could potentially be used to deliver a range of fibre-based products, including NGA broadband services and other Ethernet based services across four key market segments (Corporate, SME, Consumer, Mobile). The slide pack identified the following potential benefits of deploying a single fibre network: (1) improved delivery times, (2) a one-dig approach, building once for all fibre products; and (3) building network in the right place based on forecasted customer demand. Openreach response to question 1 of the WLA s.135 notice issued on 7 February 2018.

¹¹³ Vodafone argued that FTTH will become essential for 5G backhaul with the increased densification arising from small-cell and 3.6GHz/26GHz.mmWave use (Vodafone response to the 2016 PIA Consultation, paragraph 29). CityFibre said its fibre network is constructed to be able to serve fibre connections to mobile base stations and small cells for 4G and future 5G mobile services (CityFibre response to the April 2017 DPA Consultation, paragraph 1.1.4). CityFibre said it is "considering the possibility of using the new PIA remedy to facilitate a rollout of backhaul to small cells which could be used (in the first instance) for FWA generally and, subsequently for 5G" (CityFibre response to the April 2017 DPA Consultation, paragraph 12.3.62). We note that the exact definition of what a 5G network is and the way in which such networks would be deployed is uncertain.

¹¹⁴ [38].

between demand for leased lines and demand for ultrafast broadband, indicating that economies of scope should exist.

- a) Evidence from stakeholders indicates that in some areas there is overlap between business and residential customers. For example, based on its experience, CityFibre considered demand for leased line services to be broadly correlated with population in urban areas.¹¹⁵ Another telecoms provider [3<] provided analysis which showed that in a particular highly dense urban area, almost a quarter of businesses are located in premises which are shared with residential customers, and some of these businesses are expected to demand leased lines.¹¹⁶
- b) In the April 2017 DPA Consultation, we presented analysis on the overlap between non-residential premises (business and other organisations) and residential premises in each BT exchange area.¹¹⁷ We considered non-residential delivery points (i.e. postal addresses) as a proxy for demand for leased lines, and residential delivery points as a proxy for ultrafast broadband demand.¹¹⁸ We estimated that, on average, there is around one non-residential delivery point to every 20 residential delivery points, with a ratio varying between 1:10 and 1:30 across around six out of ten BT local exchange areas.¹¹⁹ Furthermore, most of the non-residential and residential delivery points are located in exchange areas where the ratio of non-residential to residential delivery points is within that range.¹²⁰ This suggested that there is likely to be geographic overlap between demand for leased lines and demand for ultrafast broadband.^{121 122}

¹¹⁵ We understand that, in addition to large businesses, other institutions such as schools and council buildings, as well as other applications such as CCTV networks, are increasingly demanding leased lines, including within residential areas. In addition, point-to-point leased lines are used for backhaul to mobile masts. These are increasingly located in residential areas in order to meet the rapidly increasing data demand of mobile smartphone users. Point-to-point fibre leased lines are also likely to be increasingly prevalent in the future to provide connectivity for 4G and 5G technologies. [3<].

¹¹⁶ [3<]. This telecoms provider [3<] assumed that 15% of businesses are served with a point-to-point service, i.e. a leased line. [3<].

¹¹⁷ This analysis was based on Ordnance Survey's Code-Point database, a database containing information on postal delivery points by postcode. The database classifies delivery points as domestic (residential) or non-domestic (businesses or organisations, identified as delivery points having an organisation name). We used data provided by BT in 2015 which maps postcodes to BT's exchanges to estimate the number of business and residential delivery points in each BT exchange area. Our analysis excluded Northern Ireland, as the Code-Point database does not contain information on delivery points for this area.

¹¹⁸ The analysis included all small and large businesses and organisations (such as schools and public authority buildings) with a registered organisation name in postal addresses. We recognised that this is an approximation of demand for leased lines. Some businesses are likely to demand broadband rather than leased lines services. Moreover, other possible sources of demand for leased lines – both now and in the future – are not reflected in the analysis (for example, mobile masts or CCTV).

¹¹⁹ In 63% of BT exchange areas the ratio of delivery points for business and organisations to residential is between 1:10 to 1:30.

¹²⁰ About 76% of the non-residential delivery points and 71% of the residential delivery points are located in exchange areas where the ratio of non-residential to residential delivery points is between 1:10 and 1:30.

¹²¹ Although there is some variation in the ratio of non-residential to residential premises across exchanges, most exchanges tend to have both types of delivery points and do not tend to specialise in either type of customer. If there was no geographic overlap, we would expect, for example, most non-residential delivery points to be located in exchange areas with few residential delivery points.

¹²² As discussed in Annex 24, Openreach proposed the location of leased line circuit ends as an alternative proxy for leased line demand instead of non-residential premises (see paragraphs A24.19 to 26 for a more detailed discussion on this).

- 2.138 The evidence above indicates that there is likely to be geographic overlap between the demand for broadband and non-broadband services. Therefore, economies of scope should exist in deploying a network capable of providing both of these services.
- 2.139 As to the precise magnitude of economies of scope, we have received some indicative evidence on the proportion of costs that are common across the provision of broadband services and leased lines over a single network.
- a) CityFibre estimated that approximately 20% of the total capital expenditure required to deploy an end-to-end mixed usage network is common across the provision of business connectivity and full-fibre services.¹²³
 - b) Another stakeholder ([X]) presented evidence of economies of scope in the deployment of the access network excluding lead-ins. Informed by its internal network cost modelling, this stakeholder considered that extending a residential-only network to serve business customers and point to point leased lines would involve very minimal incremental costs (equivalent to the 2% of the total capital expenditure required to deploy the residential network, excluding lead-ins).¹²⁴ This is because they are served with fibre capacity installed at the time the FTTP infrastructure is rolled out. This indicates that a material proportion of the network route of leased lines (excluding the lead in) would be common to the network routes of a ubiquitous point-to-multipoint network.

While circuit ends may be a better proxy for current leased line demand, we note that this proxy does not capture potential sources of non-broadband demand on a forward-looking basis. Nevertheless, we have looked at the distribution of circuit ends using the circuit end data Openreach provided. As we would expect, circuit ends are more concentrated across exchange areas than non-residential premises. However, we still find that a high proportion of exchanges – accounting for the majority of residential delivery points – have both residential delivery points and circuit ends, suggesting that there is likely to be geographic overlap between circuit ends and residential premises. Openreach response to question 39.a of the WLA s.135 notice issued on 12 October 2017.

¹²³ CityFibre response to question 6a of the WLA s.135 notice issued on 12 January 2018. CityFibre does not model the costs attributable to the markets as Ofcom defines them. However, CityFibre did provide a network cost model built for internal business planning purposes, which underpins its “well planned city” business model and formed part of the decision to enter the 42 cities where CityFibre has constructed a fibre spine network. The capital expenditure estimates within this model appear broadly consistent with CityFibre’s estimate that 20% of the total capital expenditure required to deploy an end-to-end mixed usage network is common across the provision of business connectivity and FTTP services. We note that the model relates to a 100% self-build end-to-end network deployment, and therefore we recognise that the costs would be lower if a telecoms provider used PIA. Nevertheless, we still consider this evidence to be indicative of the magnitude of economies of scope in a PIA based deployment, given fibre deployment costs are likely to be related to duct build costs, and our expectation that most networks will be deployed using a mix of PIA and end-to-end self-build. CityFibre noted that more up to date information will be generated by its future FTTP expansion in the up to ten cities envisaged in the CityFibre/Vodafone Strategic Partnership. CityFibre response to question 1 of the WLA s.135 notice issued on 7 March 2017, and questions 1 to 6 of the WLA s.135 notice issued on 12 January 2018.

¹²⁴ We calculated the 2% increase using outputs from this stakeholder’s internal network cost modelling. The modelling outputs shows that the incremental capital expenditure needed to extend a residential-only full-fibre network to serve business customers would be only around £35 per additional premise. We note that this stakeholder distinguishes between residential and business customers, rather than broadband and non-broadband services; this stakeholder assumes that 15% of business customers take a leased line service. [X].

2.140 This evidence suggests that the savings arising from economies of scope could be material.¹²⁵ By extending a broadband deployment to serve leased lines customers, a telecoms provider may be able to save a substantial portion of infrastructure costs and offer point-to-point leased lines at a modest incremental cost.¹²⁶ Given the business case for investing in full-fibre networks is inherently marginal and risky, due to uncertainty around a range of factors¹²⁷, economies of scope may play an important role in de-risking a pure fibre based broadband business plan. In this context, a telecoms provider unable to exploit these economies of scope may take the view that it is not viable to invest in network deployment in the first place.

Our decision on usage

- 2.141 Our view is that maintaining the current usage restriction limits the PIA remedy from being effective as a basis for large scale roll-out of competing local access networks. Therefore, unless the current usage restriction is relaxed, the PIA remedy will not achieve our aim of promoting greater network competition with a view to addressing the competition problems we have identified in the WLA market. This is because:
- a) as technology and services evolve, we believe there are benefits to relaxing the current restrictions on the use of BT's duct and pole infrastructure as this would allow telecoms providers to design their networks flexibly, respond promptly to changes in customer needs and provide innovative services; and
 - b) the ability to exploit economies of scope in deploying and providing multiple services jointly on a single network is likely to significantly improve the viability of telecoms providers' business cases, helping to justify their initial investments in ultrafast broadband.
- 2.142 In our 2016 PIA Consultation, we discussed two approaches to broaden the scope of PIA. The first is a 'mixed usage' approach where, provided PIA is used to deploy a broadband access network to residential and SME consumers at scale, the same network may also be used to deliver leased line services. The second approach we considered was an 'any usage' rule which allowed any use.
- 2.143 As explained at paragraph 2.112 above, we consider that it would be inappropriate to impose an unrestricted PIA obligation where it is possible to impose some restrictions to ensure that the PIA remedy is sufficiently limited to addressing BT's market power in the

¹²⁵ We recognise that the magnitude of economies of scope will vary across different geographies, according to the required network architecture and extent of overlap between broadband and non-broadband demand. Nonetheless, the evidence suggests that the savings arising from economies of scope could be material.

¹²⁶ We recognise that the role of economies of scope may differ depending on the nature of the business case for deployment. In a ubiquitous network a substantial proportion of the network routes to serve broadband is unlikely to be shared with leased lines, meaning the incremental cost of mass broadband roll-out is likely to remain a substantial portion of the overall cost of deployment. Therefore, the potential economies of scope facing a leased line provider considering expanding to FTTP are likely to play a different role.

¹²⁷ For example, the cost of deployment (including the extent and cost of required network adjustments), the time it will take to complete roll-out of the network, consumers' willingness to pay for fibre services, customer penetration, and the competitive response from existing market participants

WLA market, while still being effective. We remain of the view, as set out in the April 2017 DPA Consultation, that a mixed usage restriction is likely to be effective and therefore it is necessary to impose some form of mixed usage restriction on PIA.¹²⁸

2.144 As we outline in paragraphs 2.205 to 2.229, we recognise that in relaxing PIA to allow mixed usage there will be effects on business connectivity markets. However, we expect these effects to be relatively small in the short-term. In the longer term, there is greater uncertainty, but the impact could be larger. However, we consider that these effects will be outweighed by the significant dynamic benefits of network competition, which mixed usage will support.

2.145 We consider below how the current usage restriction should be amended.

Approaches to broadening PIA usage

2.146 In terms of what form of mixed usage restriction is appropriate, we have considered both a 'specific' and 'generic' rule. A specific rule would specify precisely what constitutes a broadband deployment and/or the extent to which providers can deploy leased lines in a specific area. In contrast, a generic rule would allow telecoms providers to use PIA to deploy broadband networks providing a broader range of services, without specifying the precise extent to which other services can be provided, but only insofar as this enables the investment in the provision of broadband services more generally. We believe that while a specific rule affords telecoms providers with additional certainty compared to a generic rule, the benefits of certainty are likely to be outweighed by the risk of regulatory failure as a result of limiting flexibility, for example, by imposing a network topology on telecoms providers. This may reduce the viability of their business cases, limiting the extent that investments in ultrafast broadband could be justified and placing them at a disadvantage to Openreach which is not subject to such a constraint.¹²⁹ In addition, at this early stage in the development of alternative full-fibre networks there is a potentially very wide range of types of order requests, arising from different network designs, deployments and network providers. We want to facilitate commercial scale investment in full-fibre networks which in some cases may take innovative forms that we have not anticipated. In this context, there is a risk of regulatory failure associated with a specific rule which may deter potentially innovative and efficient forms of deployment.

2.147 Given these drawbacks associated with a specific rule, we have considered whether this can be addressed by the suggestion made by Openreach in its responses to the April 2017 DPA and 2016 PIA consultations, that these restrictions could be overcome by offering

¹²⁸ We note that in response to the 2016 PIA Consultation and the April 2017 DPA Consultation, various stakeholders set out views on the any usage rule including views on the risks and challenges. Given our provisional view that it is necessary to impose some form of use restriction, we do not respond to those views.

¹²⁹ Openreach argued that a specific rule is more suitable as a generic rule would lack certainty and transparency, which are part of our key regulatory objectives, and would impose a far greater resource burden on Openreach and us. Openreach noted a specific rule has the benefit of increased certainty and can be better designed to achieve the specific outcomes a mixed usage rule is intended to achieve, while protecting against the unintended consequences of a lack of FTTP investment. Openreach response to the 2016 PIA Consultation, page 27, paragraph 125.

exemptions from them in exceptional cases.¹³⁰ However, we are concerned that in practice a specific rule would be an inflexible ‘check-list’ requiring an intensive assessment of every individual order, and would therefore lead to delays in the ordering process and frequent reliance on exemptions which would lead to a de facto generic rule. This would also potentially place a significant administrative burden on Ofcom due the number of disputes that may arise and risk making the rule unworkable. We have therefore concluded that in this context a generic rule would be more effective than a specific rule.

- 2.148 In contrast, we consider that a generic rule is likely to be effective since it will allow for some flexibility while ensuring that telecoms providers are not permitted to use PIA in a way that is not consistent with our aim to promote greater competition in the WLA market. We also believe that this approach will be workable in practice, as discussed in terms of implementation below.
- 2.149 Further, we have concluded that a generic mixed usage rule would also be the least onerous requirement necessary to address our competition concerns. For the reasons set out above, we consider that the less onerous approaches of restricting use exclusively to deployment of broadband networks, or setting out a specific mixed usage rule, would not be effective. Were the market environment to change in the future we would consider if this approach should change, to reflect this.
- 2.150 We have concluded that it is appropriate to relax the current PIA usage restriction to allow ‘mixed usage’ so that PIA can be used to deploy local access networks offering both broadband and non-broadband services provided: the purpose of the network deployment is primarily the delivery of broadband services to homes and businesses; and provided this mixed use enables the investment in the provision of broadband services more generally. This will support the effectiveness of the PIA remedy in the WLA market.

Implementation of the mixed usage rule

- 2.151 In the April 2017 DPA Consultation, we proposed a generic mixed usage rule under which BT is required to give access to its physical infrastructure for the purposes of the deployment of broadband access networks serving multiple premises primarily for the provision of broadband access services to end users; that is, PIA could only be used to deploy networks offering non-broadband services where the purpose of the network deployment is primarily the delivery of broadband services.
- 2.152 We consider that this primary purpose requirement is necessary to support the effectiveness of the PIA remedy in the WLA market. The primary purposes requirement means that telecoms providers would only be able to use the PIA remedy to provide services that are not part of the WLA market or downstream from the WLA market in scenarios involving the extensive roll-out of local access networks. This therefore ensures that the remedy is focused on addressing the competition problems we have identified in

¹³⁰ To address the concern of unintended consequences discussed above, Openreach considered a specific rule could apply except in exceptional circumstances where telecoms providers could apply to us for a derogation. Openreach noted there are mixed usage planning rules in the property sector which could provide a model for how this might work.

the WLA market. We explain in the next section how we would expect to interpret this requirement.

- 2.153 In order to reflect the need for the provision of non-broadband services to enable the investment in the provision of broadband services, the draft SMP condition proposed in the April 2017 DPA Consultation further specified that the delivery of non-broadband access services must “facilitate that overall broadband access network deployment”.
- 2.154 The inclusion of this wording in the SMP condition suggested that access seekers would be required to demonstrate on a case by case basis that the broadband access network deployment in question could be shown to be facilitated by the provision of non-broadband services, for example through business plans. However, as explained above the way in which network investment decisions are taken means that this is an artificial way of considering how non-broadband services facilitate broadband network deployments.
- 2.155 We explain above why, in general, the provision of non-broadband services alongside broadband services can be expected to facilitate the business case for broadband network deployment (reduced uncertainty about the ability to meet demand in future, ability to exploit economies of scale and scope). It is on this basis that we are relaxing usage restrictions to encourage and support investment in competing networks. We consider that it follows on from this, where non-broadband services are included as part of a network deployment that satisfies the primary purpose requirement, the inclusion of any non-broadband services will be helping to facilitate the overall deployment; therefore, facilitation can be presumed as long as the primary purposes requirement is met. Therefore, including a specific reference to facilitation in the SMP condition is both artificial and unnecessary. Consequently, we have decided to remove this from the SMP condition.

Openreach’s argument about extending the remedy into the BCMR

- 2.156 Openreach expressed concerns that the mixed usage rule encroaches on regulation imposed on business connectivity services in the BCMR. It argued that before imposing the mixed usage DPA remedy, which impacts business connectivity products, we should identify a competition problem in the business connectivity market.¹³¹ It claimed that we have failed to identify such concerns and that, even if these concerns were identified, we have failed to explain why they could not be addressed by the remedies imposed within the BCMR.¹³²
- 2.157 We disagree with Openreach’s view that, in order to impose a mixed usage PIA remedy, we need to have identified a competition concern in the business connectivity market. The mixed usage PIA remedy is specifically targeted at addressing the competition concerns we have identified within the WLA market. It is not aimed at addressing competition concerns that fall outside the scope of this review and it does not seek to address any competition concerns within the business connectivity market.

¹³¹ Openreach response to the April 2017 DPA Consultation, paragraph 91.

¹³² Openreach response to the April 2017 DPA Consultation, paragraph 91.

Geographic reach

- 2.158 The geographic scope of our PIA remedy was previously defined by reference to BT's local access network architecture, specifically BT's duct and pole network between BT's network termination point and BT's local access node.
- 2.159 Our intention was only to limit usage of PIA to local access network deployments. We did not wish to impose or imply a requirement for telecoms providers to adopt a network topology similar to BT's (e.g. to locate their local access network nodes at, or near to, BT's Next Generation Access (NGA) network exchanges).¹³³ We also wish to permit telecoms providers to deploy local access networks using a combination of their own infrastructure and PIA, 'breaking in and out' of BT's physical infrastructure as required.¹³⁴
- 2.160 During the consultation process, various stakeholders explained that the previous geographic scope of PIA risked restricting telecoms providers to BT's network architecture when using PIA to deploy ultrafast broadband networks. BT's network architecture is that of a copper network. However, when deploying an ultrafast broadband network, it is likely that BT's architecture may not be optimal. For example, BT's own FTTC network adopts a different network architecture with fewer aggregation points. There was therefore a risk that the restrictions on geographic scope meant PIA could be used only for part of a telecoms provider's local access network (because their local access network area is larger than BT's copper one) hence rendering the remedy less effective than it should be.
- 2.161 Consequently, we have concluded that it is necessary to amend the geographic scope of PIA to make the remedy effective. While it is possible to impose no limitation on the geographic scope of the PIA remedy, there is a risk that an unconstrained PIA obligation, in respect of geographic scope, may be used by telecoms providers for purposes that are not consistent with a remedy in the WLA market. For instance, telecoms providers may have an incentive to use PIA for core networks.
- 2.162 Therefore, we consider that it remains appropriate to restrict the geographic scope of PIA to the deployment of the local access part of a broadband network. However, rather than imposing this limitation by reference to BT's local access network architecture, we are broadening it, so that PIA may be used between network termination points and the local access node of an access seeker's equivalent network architecture serving those termination points.
- 2.163 As outlined above, this proposal was widely supported by stakeholders in their responses to the April 2017 DPA Consultation.

¹³³ However, telecoms providers may choose to locate their local access nodes at BT exchanges and the PIA condition requires BT to provide co-location services at exchanges.

¹³⁴ The previous PIA remedy limited geographic scope by setting an expectation that the maximum distance between network termination points (customers' premises) and local access nodes should be BT's fibre access nodes, used for FTTC and FTTP. We consider these distances are likely to be as much a function of the population distribution of the UK as BT's legacy copper network architecture and therefore reasonably representative of the reach of NGA networks generally, however, we acknowledge that telecoms providers may in some circumstances wish to deploy local access networks with greater reach than BT's.

- 2.164 Therefore, we have concluded that to ensure an access seeker can design an equivalent local access network to that of Openreach, without being bound to Openreach’s network design choices to modify the PIA condition to broaden the geographic scope of usage, such that telecoms providers will be permitted to use PIA for local access networks between network termination points (i.e. customers’ premises) and their local access node serving those network termination points. This revision also makes clearer that there is no requirement for telecoms providers’ local access networks to be bound to BT’s topology.¹³⁵

How our decisions on the scope of PIA will work in practice

- 2.165 We now set out our decisions and views on how the revised scope of PIA will work in practice.
- 2.166 We first explain that our overall objective in imposing this remedy – to facilitate investment in broadband networks – shapes our approach to the way we will oversee, and ultimately enforce, its operation in practice.
- 2.167 We then address a number of process considerations, including the approach that Openreach may take to order requests, the handling of confidential material, the potential role of Alternative Dispute Resolution, and Ofcom’s role in the process. Finally, we update our guidance on the features of deployment that appear relevant to any dispute regarding the mixed usage and/or geographic scope rules.

Objective of investment in broadband

- 2.168 As we explain above, our overall objective in imposing the PIA remedy is to stimulate scale investment in broadband networks, to promote downstream competition. The overarching consideration in any assessment of compliance with the mixed usage and/or geographic scope rules will therefore be to establish whether the primary purpose of the network deployment in question is the delivery of broadband services to homes and/or businesses in the relevant local area. It follows from this that, as a general principle, we would only expect our usage rule to be met where this primary purpose is clear from the available evidence and where the inclusion of non-broadband services is clearly secondary to that primary purpose. In particular, we would expect to reject network deployments that are leased line deployments which seek to include an element of broadband supply in an attempt to meet our usage rule.
- 2.169 This overall policy objective of encouraging network investment has shaped our approach to process considerations and the guidance we set out below, and thus we are not taking a prescriptive approach to defining in detail the individual network segments that can make up order requests.

¹³⁵ In the Legal Instruments we have adjusted the definition of a ‘Local Access Node’ to include ‘an operational building of the Dominant Provider or Third Party which is reasonably equivalent to a Main Distribution Frame or Optical Distributional Frame site’.

Process considerations

- 2.170 We note that Openreach (and other telecoms providers) have experience of making the previous usage restrictions on the PIA remedy work in practice. The PIA Reference Offer (and product descriptions) sets out the permitted usage, requiring that the PIA customer warrants that it will use the service solely for the purpose set out. A similar approach may be feasible in the context of the revised usage requirements, at least for most of the orders that Openreach receives. In general, we do not anticipate that it should be unduly complex or time-consuming for Openreach to determine whether an order request is reasonable.
- 2.171 We recognise that Openreach may decide to adapt its processes in light of the change to the usage requirements. However, while some order requests may require more time and information than others to consider, we would not expect Openreach to introduce unreasonable requirements and processes causing unjustified delays, given that the SMP conditions we are imposing require it to accept reasonable network access requests. More generally, in Section 6 we set out our decisions concerning the PIA ordering process and the role of service level agreements (SLAs) to ensure this process is not unduly delayed by Openreach response times to order requests.
- 2.172 In handling PIA access requests, Openreach should take account of our overarching policy objective and the guidance that we set out below on features we would consider in any dispute regarding the consistency of order requests with the usage requirements. We also expect access seekers to take due account of this guidance before submitting order requests and entering into contracts with Openreach. However, Openreach should not regard the guidance as a ‘check-list’ to conduct an intensive assessment of every individual order (for example, we would not expect Openreach to attempt to scrutinise the access seeker’s business plans every time an order is processed). Given our overall policy objective, we consider that it should be relatively simple to determine if orders are consistent with usage restrictions in most cases.
- 2.173 We do not consider it necessary or appropriate for Ofcom to assess whether individual orders are compliant with the usage restrictions when submitted (as suggested by PAG). Our overall objective in relation to the remedy, supported by the guidance on factors we would consider in the event of a dispute, should provide the basis for effective operation of the remedy in practice. However, we will monitor Openreach’s compliance with the SMP conditions in relation to network access and the usage requirements, in addition to our role in assessing any disputes that are referred to us.
- 2.174 Some telecoms providers raised concerns about being required to provide commercially confidential information to Openreach, such as their business plans and network designs (which may be a hybrid model of PIA and self-build). In many cases, we expect that Openreach will not need access seekers to provide information beyond the details of the duct and poles they are seeking access to, but there may be occasions where Openreach considers this is justified in order to determine if a request is reasonable. If this proves to be the case, Openreach will need to be mindful of the legitimate concerns of providers regarding confidentiality and fair competition. Any information provided to Openreach in

confidence as part of a PIA application is protected through the requirements set out in General Condition 1.2. This precludes the passing of information gathered for the process of negotiating network access to any other part of Openreach where it could provide a competitive advantage. We set out in Section 6 our expectations that Openreach will ensure processes are in place that ensure compliance with this General Condition 1.2, as is already required. If Openreach does request sensitive information from access seekers when considering order requests, this requires it to have robust information sharing controls in place between the part of Openreach that deals with order requests and other parts of the business.

- 2.175 Openreach and some other telecoms providers suggested that the consistency of a significant number of order requests with the mixed usage requirements may be uncertain and/or disputed. We do not anticipate that this will be an issue beyond a small number of cases. However, if Openreach and other providers disagree, they may wish to consider the option of establishing Alternative Dispute Resolution (ADR) arrangements as part of their negotiations on the Reference Offer for PIA. An ADR process may also provide a mechanism for the consideration of commercially sensitive material by an independent source.
- 2.176 Were Openreach to receive a request for PIA from a telecoms provider and Openreach rejected such a request, we would expect Openreach to provide reasons to explain any such rejection, which for example might relate to the telecoms provider's compliance with the mixed usage rule. The provider may then consider whether it wishes to challenge Openreach's reasoning, including through dispute resolution under the Communications Act 2003.

Relevant features of network deployment

- 2.177 In the April 2017 DPA Consultation we set out factors we would be likely to take into account when considering compliance with the mixed usage and/or geographic scope rules, in the context of any such disputes we might take on. Having considered responses to the consultation, we have updated this guidance, which we set out below.
- 2.178 The changes we have made in light of stakeholder comments include the following:
- We have clarified that the PIA remedy might be used to support provision of broadband services to business customers only (it is not essential for broadband services to be provided to residential customers).
 - We have recognised that while the sharing of passive network elements to provide broadband and non-broadband services is one example of efficiencies that could be realised at the local access area level, there are other potential forms of efficiencies (e.g. sharing a truck roll) that could be realised and demonstrated from use of PIA.
 - We have acknowledged that the public marketing of broadband services may not take place until the latter stages of a deployment, and in any event might not be undertaken by a wholesale-only network operator.

- 2.179 Some stakeholders suggested we should provide significantly more detailed guidance, such as exhaustive lists of acceptable and unacceptable usages of PIA. We have concluded that this is not appropriate, at least at this early stage in the development of alternative full-fibre networks. There is a potentially very wide range of types of order requests, arising from different network designs, deployments and network providers. We want to facilitate commercial scale investment in full-fibre network, which in some cases may take innovative forms that we have not anticipated. In this context, there is a risk of regulatory failure associated with attempting to comprehensively define and prescribe acceptable (or unacceptable) approaches to network investment, and we do not want to deter potentially innovative and efficient forms of deployment. There is also a risk that an access seeker focused on providing ‘non-broadband’ services might game prescriptive rules, if we lose focus on the overall objective of facilitating deployment of broadband services.
- 2.180 However, at a later stage, we may update this guidance with more specific information relating to certain circumstances if, for example, it becomes clear that there is significant demand for PIA for a particular type of network design (e.g. connectorised cables, placement of junctions) and demonstrable uncertainty regarding consistency with the usage requirements.
- 2.181 There are several features of telecoms providers’ deployments which appear relevant to any dispute regarding whether requests for network access are consistent with the mixed usage and geographic scope rules we are imposing on BT. These features include:
- **Certainty of the intention to undertake a broadband deployment** – Evidence of clear intent to invest in broadband networks is the key feature in establishing whether the primary purpose of the network deployment is to provide broadband services. An approved and funded business plan to invest in networks providing broadband services is likely to demonstrate this intention, particularly if external investors have provided capital for such a plan. We recognise that some network deployments may be phased with, for example, leased lines services being deployed in advance of broadband services. We believe that a mixed usage rule should be flexible to allow for this. The potential for phased service deployment may therefore require determining the commitment of the telecoms provider to deploy broadband services. For example, contracts in place with residential developers for broadband services, or committed funding and orders for equipment only suited for broadband services would evidence significant intention. We recognise that in some cases the staging of deployment may mean that contracts or orders for broadband services/equipment may not yet be in place, however, providers may be able to demonstrate intent to deploy broadband in other ways. We also recognise that public marketing of broadband may not take place until the latter stages of a deployment, and in some cases this will not be the responsibility of an access seeker, if they are a wholesale-only network provider. However, an internal business case, unfunded and for discussion purposes only, would by itself be unlikely to be persuasive of sufficient intention to meet the requirements of the mixed usage rule. In general, the more time that passes between the deployment of leased lines and the planned deployment of broadband services, the

less likely it is that a telecoms provider will be able to demonstrate evidence of sufficient intention to undertake a broadband deployment. We believe the degree of phasing in network deployment that is most likely to be allowed under the mixed usage rule is that which reflects the practicalities of deploying a mixed-use network, rather than the deployment of just leased lines services followed by a separate deployment of broadband services at some point in the future.

- **Geographic location of the infrastructure** – As outlined above, we have decided to broaden the geographic scope so that PIA may be used between a telecoms provider's network termination points and the local access node serving those termination points. We would still expect telecoms providers to be able to demonstrate that their usage of PIA is for local access segments of their network. In the event of a dispute we might consider the distance between network termination points and local access nodes in comparable networks as a guide to understanding if the telecoms provider's use of PIA was within the local access area. If distances appeared to be longer than other access networks we would consider if this was because of the technology or architecture adopted by the telecoms provider. For example, if a telecoms provider already has a local access node in a neighbouring town, while its local area geography would be different to BT's, its use of PIA may still be within the local access area. However, if the requested PIA usage does not support the provision of broadband services (e.g. solely a mobile backhaul circuit to a large cell site), it is unlikely to meet the usage requirements.
- **Services to be offered within the deployment** – Specifically the mix between broadband network services and non-broadband services (such as leased lines) in the local area. The primary purpose of a deployment should be broadband networks. For example, a deployment plan that forecasts telecoms providers installing more leased lines than the number of broadband premises passed would be unlikely to meet the requirements of the mixed usage rule (though as we have stated above we recognise that sometimes the installation of broadband services may follow at a later stage than leased lines deployment). We would also consider the extent to which the mixed use supports investment in the provision of broadband services more generally, including self-build of broadband networks. Relevant factors would include the type of customers being targeted and the type of services being sold to wholesale and/or retail customers. We would expect the usage to facilitate the provision of broadband services to customers, but in some cases this might include provision of broadband services to business customers only (it is not essential for services to be provided to residential customers, although given we are concerned with the deployment of scale broadband networks, we would expect networks serving business customers only would be relatively unusual).
- **Demonstrable sharing of services and efficiencies in the local access area** – We would expect telecoms providers to be able to demonstrate that their usage of PIA is associated with the provision of broadband, in addition to leased lines (or other non-

broadband) services. For example, this might be demonstrated by leased line services sharing passive network elements with broadband services, to a material extent. There could also be other demonstrable efficiencies – such as a shared truck roll – derived from leased lines and broadband services being provided in the same local access area.

- **How broadband networks are designed and provided** – We will consider if the network deployment and architecture is designed to facilitate future broadband provision. For example, the construction of additional chambers and routes that bring the duct network closer to residential premises than would be necessary if building a network for leased lines only. We recognise that some telecoms providers may choose a network architecture to provide broadband services to multiple premises that may also be suited for providing leased lines. As discussed above, we want to support technological innovation and flexibility in how services are provided.

2.182 While PIA may be ordered on an individual segment by segment basis, it would not be practicable to assess what each individual segment is being used for. Nor would a focus on individual orders be consistent with the way in which decisions to invest (or not) in broadband networks are made, which will take a broader perspective across the local access area(s). Therefore, in the event of a dispute, we would expect to consider the above features applied across the local area, looking holistically at the network deployment in the local access area. In the case of a hybrid network deployment, where PIA is only used for some segments of an overall network design while the rest of the network infrastructure is self-built, we would expect to take a similar holistic approach.

2.183 While the guidance above sets out considerations we think are likely to be relevant in the event of a dispute, each referral would be assessed on the specific facts of the case. The above list is not an exhaustive set of features that we would take into consideration in any dispute, not least as there may be innovations during the market review period which have not yet been identified.

Adverse effects

2.184 In this sub-section, we consider whether the PIA remedy, including the scope restrictions discussed above, might give rise to adverse effects which are disproportionate compared to the aim of the proposals.

2.185 In Section 4, we set out how certain costs incurred by Openreach in relation to the provision of PIA should be recovered. We consider whether this particular aspect of the PIA remedy might give rise to adverse effects in Section 4.

Our proposals

2.186 In our April 2017 DPA Consultation, we considered whether our proposed PIA remedy, including the scope restrictions discussed above, might give rise to adverse effects which are disproportionate compared to the aim of the proposals. We considered the following:

- a) **Cost of competition:** We recognised that there may be duplication of some fixed costs, but believed that this is likely to be outweighed by the significant benefits of greater network competition.
- b) **Impact on end-to-end competition:** We recognised that existing end-to-end competitors may face a more competitive environment where they have already deployed networks, but PIA also provides them with opportunities to expand their networks to areas where it would not be viable to deploy their own physical infrastructure. We also recognised that encouraging network competition based on PIA could undermine incentives to undertake further end-to-end investment where this would otherwise have been viable, but considered that this is likely to be outweighed by the significant benefits of greater network competition. We also noted that PIA based competition entails much lower duplication of fixed costs than end-to-end competition.
- c) **Additional costs and resource requirements imposed on Openreach:** We considered that the cost and resource required for Openreach to develop the PIA product and processes further were relatively modest. We recognised that the requirement to make network adjustments could have a material impact on Openreach, with it needing to expand its workforce. However, we considered that this was sufficiently predictable given any increase in requests could be expected to be gradual and telecoms providers are required to submit forecasts. We also considered that the impact on Openreach is justified by the significant benefits from greater network competition.
- d) **Impact on business connectivity markets:** We did not consider that our proposed scope restrictions would have a significant adverse effect on business connectivity markets. We expected the impact on Openreach's cost recovery of regulated products to be small in the short-term, but recognised that the impact in the longer term could be significantly greater. We acknowledged that end-to-end providers of business connectivity services may face a more competitive environment in certain areas, while noting that they may also benefit from broader uses of PIA as they would now be able to deploy networks providing both residential broadband and high-quality business connectivity services at lower cost.

Stakeholder responses

- 2.187 Openreach disagreed with our analysis of the additional resource requirements and costs it would face as a result of our proposals. It argued that the impact on its finances, resources and external contractors is likely to be highly significant.¹³⁶ Openreach argued that to enable large scale investments, planning windows, resource recruitment, resource allocation and funding would all need to be agreed and planned over a designated deployment period. Openreach argued that such arrangements would need long-term financial commitments of duct occupancy otherwise there would be considerable waste

¹³⁶ Openreach response to the April 2017 DPA Consultation, paragraph 28.

and inefficiency.¹³⁷ Openreach noted that there is no limitation on the numbers of telecoms providers which may request such services concurrently from Openreach, and that the capacity of their external contractors is already under strain.¹³⁸

- 2.188 Openreach argued that we had significantly underestimated the potential risks and consequential adverse impacts associated with relaxing usage restrictions.¹³⁹ Openreach commented that we should have explained why our views set out in the present consultation were different from our view in the 2016 BCMR statement.¹⁴⁰
- 2.189 Openreach expressed concerns that we had not provided a full detailed assessment of the linkage between a mixed usage PIA rule and the existing regulation in the BCMR,¹⁴¹ in particular the scope for arbitrage.¹⁴² Openreach commented that mixed usage PIA would impact unregulated services and areas, and argued that we had not considered this impact.¹⁴³
- 2.190 TalkTalk considered that the mixed usage rule will not pose any meaningful risk to BT's cost recovery and noted that we can monitor this through the market review period.¹⁴⁴ [X] agreed the impact on the active leased line market will be minimal within the review period.¹⁴⁵
- 2.191 Colt and Zayo argued that our mixed usage rule was discriminatory, providing telecoms providers deploying broadband and leased lines networks using PIA with a cost advantage over telecoms providers deploying leased lines only networks.¹⁴⁶

Our reasoning and decisions

- 2.192 We remain of the view that the form of PIA remedy we are imposing is unlikely to give rise to adverse effects which are disproportionate compared to the aim of the remedy. Below, we consider the following adverse effects:
- a) the cost of competition;
 - b) the impact on end-to-end competition;
 - c) the additional costs and resource requirements on Openreach; and
 - d) the impact on business connectivity markets.

¹³⁷ Openreach response to the April 2017 DPA Consultation, paragraph 30.

¹³⁸ Openreach response to the April 2017 DPA Consultation, paragraphs 30 and 153.

¹³⁹ Openreach response to the April 2017 DPA Consultation, paragraph 368. We deal with Openreach's full response to our methodology in Annex 24.

¹⁴⁰ Openreach response to the April 2017 DPA Consultation, paragraph 91.

¹⁴¹ Openreach response to the April 2017 DPA Consultation, paragraph 90.

¹⁴² Openreach response to the April 2017 DPA Consultation, paragraph 91.

¹⁴³ Openreach response to the April 2017 DPA Consultation, paragraphs 92 to 93.

¹⁴⁴ TalkTalk response to the April 2017 DPA Consultation, paragraph 3.8.

¹⁴⁵ [X].

¹⁴⁶ Colt response to the April 2017 DPA Consultation; Zayo response to the April 2017 DPA Consultation.

Cost of competition

- 2.193 By avoiding the need for rivals to build their own infrastructure, PIA-based competition entails much lower duplication of fixed costs than end-to-end competition. However, there may still be duplication of some fixed costs (for example, fibre and active network elements, and network adjustments¹⁴⁷), which could put upward pressure on industry average costs.
- 2.194 However, a competitor using PIA to deploy a competing network will most likely deploy a full-fibre network. This is not a simple duplication of the existing network that still relies partly on a copper connection, it is a new means of offering broadband that offers a number of advantages, including much higher speeds and improved service quality.¹⁴⁸ The existing copper network will in future need to be supplemented with new technologies such as full-fibre and this process of network upgrade will involve simultaneous provision of the current copper network and full-fibre. PIA facilitates this process of network upgrade, and provides the foundations for this process to be subject to more effective competition. However, there is likely to be duplication of copper and full-fibre, whether PIA is used to provide the new technologies or not.¹⁴⁹
- 2.195 In any case, in this review period, we expect any impact from fixed cost duplication and loss of scale to be small given the natural constraints on build rates associated with mass broadband deployments. For example, we estimate that up to [X] households could be taking services provided over a new access network built using PIA by the end of 2020/21– which provides an upper bound for the reduction in Openreach volumes by the end of this period.¹⁵⁰ This amounts to a reduction in Openreach volumes of around [X]%.
- 2.196 Over the longer term the impact may become more significant if BT’s competitors roll out networks on a much larger scale. However, as noted above, in the long-term we expect new technologies to be required which will likely involve some element of duplication of the existing copper network and new networks, whether or not PIA is utilised for deployment of new technologies.

Impact on end-to-end competition

- 2.197 An effective PIA remedy will reduce the absolute costs and time required to build ultrafast broadband networks at scale. We have considered what effect this will have on end-to-end

¹⁴⁷ The costs of network adjustments required to make the physical infrastructure useable are also a duplicated fixed cost, except where the network adjustment would have been required anyway, for example, as part of normal network maintenance.

¹⁴⁸ See Section 5 of Volume 1, ‘Approach to remedies’.

¹⁴⁹ We also note that some element of fixed cost duplication where there are economies of scale is likely to be a feature of many markets in the broader economy.

¹⁵⁰ We estimate that, by the end of this review period, around [X] homes could be passed by new networks deployed using PIA. The impact on Openreach’s volumes will then depend on the possible penetration rates that can be achieved by a new access network. Assuming a maximum penetration rate of 35% points to around [X] households taking services provided over a new access network.

competition (i.e. where competitors build their networks from scratch, including building their own physical infrastructure).

- 2.198 We recognise that existing end-to-end competitors which have already deployed networks by building their own physical infrastructure may face a more competitive environment in certain areas, which could affect their ability to retain some of their customers without adjusting prices. However, at the same time, an effective PIA remedy provides these telecoms providers with opportunities to expand their networks at lower cost and more quickly, allowing them to compete in other areas where it would not be viable to deploy their own physical infrastructure. We observe that many existing end-to-end competitors, including Virgin Media¹⁵¹, are supportive of our intention to give operators improved access to BT's physical infrastructure.
- 2.199 We recognise that encouraging network competition based on PIA could undermine incentives to undertake further end-to-end investment where this would otherwise have been viable. Given the higher costs and time required to build a new network from scratch, the scope for end-to-end network competition is more limited than the scope for network competition based on PIA. Therefore, to the extent our remedy displaces some end-to-end competition, this is likely to be outweighed by the significant benefits of realising network competition based on PIA in potentially many more geographic areas.¹⁵² Moreover, as discussed above, PIA based competition entails much lower duplication of fixed costs than end-to-end competition.

Additional costs and resource requirements on Openreach

- 2.200 Some of our proposals will impose additional resource requirements and costs on Openreach.
- 2.201 First, we are requiring Openreach to undertake work to develop the PIA product and processes further to support the deployment of competing networks at scale. The most significant of these in the short-term is likely to be the requirement to make improvements to its systems (see Section 6). We expect the costs and resource requirements on Openreach to be relatively modest.¹⁵³ In Section 4, we explain that we are allowing BT to recover these costs across all users of the infrastructure. As to the resource requirements, we think there is unlikely to be any material adverse impact on Openreach, particularly given that Openreach has already been engaged in making improvements to the PIA processes and online mapping systems over the past year.

¹⁵¹ Virgin Media response to the 2016 PIA Consultation, page 1. Virgin Media has also told us that, under the right conditions, it is very interested in using PIA as a way to reduce the cost of expanding its network. It is currently undertaking a number of PIA trials, and considers the economics of PIA to be attractive relative to pure self-build. Meeting between Ofcom and Virgin Media on 5 February 2018.

¹⁵² Even taking into account the incremental benefits of end-to-end competition over PIA-based competition.

¹⁵³ To better understand the potential timescales and costs involved in developing such a system, we sought advice from external consultants Mott MacDonald. The report provides Mott MacDonald's broad estimates of the timescales and costs of developing such a system. Mott MacDonald, April 2017. *DPA Solution System Requirements Specification*.

https://www.ofcom.org.uk/_data/assets/pdf_file/0013/101542/duct-pole-access-report-mott-macdonald.pdf

- 2.202 Second, our remedy includes a requirement on Openreach to make adjustments to its network where this is necessary for its physical infrastructure network to be available to telecoms providers for the purpose of deploying their own networks. In some cases, Openreach would have to undertake this work in any event to maintain its network, albeit the request under PIA may bring forward the timing of this work. Notwithstanding these cases, we recognise that the requirement could have a material impact on Openreach, both in terms of the resources required to carry out the civil works, and the costs associated with these adjustments. In Section 4, we explain that we are allowing BT to recover these costs across all users of the infrastructure. With respect to the resource requirements, we recognise that over time Openreach could see a significant step up in the volume of civil works it is required to undertake or oversee. Openreach may need to expand its workforce, for example, by hiring more network planners and field engineers.¹⁵⁴
- 2.203 However, we consider that the resource burden is sufficiently predictable for Openreach to manage without any significant adverse impact, for two reasons:
- a) First, any increase in the requests for network adjustments will be gradual, given the natural constraints on build rates associated with mass broadband deployments and the likelihood that it will take time for telecoms providers to increase their roll-out to the maximum deployment rate.
 - b) Second, as explained in Section 6, we have decided that the PIA Reference Offer should include conditions for the provision of forecasts by telecoms providers in respect of their future requirements for PIA, to assist Openreach to plan its resources.¹⁵⁵
- 2.204 We also observe that requests for Openreach to relieve congested sections in its infrastructure will only arise where other telecoms providers are using PIA to deploy competing networks. Therefore, the scale of the impact on Openreach is contingent on the scale of network deployment, and so is directly linked to the scale of the benefits that result from imposing the PIA remedy.

Impact on business connectivity markets

- 2.205 We have considered the impacts of our decision to allow PIA to be used for provision of non-broadband services, including symmetric-speed point-to-point leased lines, in the business connectivity markets.
- 2.206 In general, we believe the usage and geographic scope restrictions we have applied to our PIA remedy mitigate any impact:

¹⁵⁴ Openreach argued that questions of how the required numbers of civil infrastructure contractors would be trained and recruited in the UK, and how large-scale projects would be backed off against contractor/supplier's financial commitments are not considered in any detail, and are unfairly passed over as problems for Openreach to solve in relation to its PIA service. We disagree. We consider that Openreach is best placed to address these issues (as it will have to in relation to its own network deployments).

¹⁵⁵ Our view is that the detailed arrangements for forecasting, including the information to be provided, any linkage with SLA/SLGs and the timescales over which forecasts should be provided are best agreed through industry discussions between Openreach and other telecoms providers.

- The geographic reach of our PIA remedy excludes backhaul services, and therefore these services would not be impacted. We understand that a significant proportion of leased lines are used for backhaul purposes.
 - The mixed usage rule means that telecoms providers will only be able to use the PIA remedy to provide leased lines in the context of a network deployed with the purpose of primarily delivering broadband services. This will not only limit any impact on markets outside WLA but also ensure that any adverse effects are associated with benefits in the WLA market. In particular, large impacts in the business connectivity markets would only arise in scenarios where there has been extensive roll-out of rival local access networks. These scenarios would entail a transformational change in the competitive conditions of the local access area, and therefore be associated with substantial benefits.
- 2.207 The mixed usage rule also means that our proposals are unlikely to have a significant impact in business connectivity markets within this market review period. The natural constraints on build rates associated with mass broadband and leased line deployments mean that only a proportion of leased lines would be within reach of the new networks in the short-term.¹⁵⁶ Moreover, suppliers and customers are often reluctant to replace existing leased lines, and PIA may only be primarily used where a new leased line is required or where it is being replaced for other reasons.¹⁵⁷
- 2.208 We acknowledge that impacts in the longer term of allowing mixed usage are more uncertain and harder to predict, although still bounded by the scope of the remedy. We recognise that the ability to use PIA to supply leased lines under our mixed usage approach may have a more significant impact on business connectivity markets in the long-term.
- 2.209 In particular, we note BT's concern that widespread use of the PIA remedy we are imposing (including for leased lines) would result in BT having to change its existing pricing structure.¹⁵⁸ The current pricing structure set by BT involves it recovering its common costs across different services. It is possible in theory that competitors may be able to use PIA to undercut BT's prices for some leased lines. Should this occur, for BT to have the opportunity to recover its efficiently incurred costs, it may be necessary for it to rebalance its pricing structure over time, though we note that Openreach did not provide evidence in its response that wide scale arbitrage opportunities would exist under a mixed usage form

¹⁵⁶ As set out in our guidance above, we believe the mixed usage rule should be flexible to allow for phased network deployments. We recognise that this means that leased lines may be deployed in advance of broadband services, but still consider that the speed at which leased lines can be deployed would ultimately be constrained by the build rates associated with mass broadband deployments. This is because the more time that passes between the deployment of leased lines and the deployment of broadband services, the less likely it is that a telecoms provider will be able to demonstrate evidence of sufficient intention to undertake a broadband deployment, as required in our guidance.

¹⁵⁷ For example, in the BCMR 2016, we considered that there were significant barriers to switching which limit the willingness and ability of telecoms providers to switch existing circuits in the short-term. We assumed significantly lower proportions of BT's existing circuits would switch to a dark fibre access product compared to new connections. BCMR Final Statement 2016, Annex 33, paragraph A33.11, A33.109 to 111 and Table A33.1. See also paragraphs 4.495 to 4.496 of 2016 BCMR Statement.

¹⁵⁸ Openreach response to the April 2017 DPA Consultation, paragraphs 93.

of the PIA remedy or that the scale of the pricing rebalancing would be large or that any restructure will entail significant inefficiencies.

- 2.210 In general, when imposing wholesale access remedies in market reviews, Ofcom has given BT flexibility in setting prices in the hope that this would lead BT to recover its common costs relatively efficiently. However, taking regulatory measures in order to encourage relatively efficient pricing in circumstances where competition is absent does not imply that it is desirable to restrict (or avoid promoting) competition simply in order to preserve Openreach's ability to set prices flexibly. The purpose of the PIA remedy is to subject BT and the decisions it makes to substantially greater competition and contestability. We accept that the presence of effective competition would mean Openreach will have less control over pricing; that is a natural and desirable constituent of a more competitive market.
- 2.211 We do not expect that any pricing restructuring is likely to entail large efficiency losses, even if it were to occur on a widespread scale. We think that the dynamic gains from introducing the substantially more effective competition that would accompany widespread roll out of competing networks would far outweigh any static losses arising from a degree of pricing rebalancing. In future market reviews, we will be able to consider the most appropriate approach to regulation taking account of developments, including the extent of any effects as they become clearer.
- 2.212 Below, we consider the following specific impacts in the business connectivity markets, focussing on the impact in this review period:
- the impact on BT's cost recovery of regulated products; and
 - the impact on end-to-end competitors.

Impact on BT's cost recovery of regulated products

- 2.213 By allowing telecoms providers to use PIA for business connectivity services in certain circumstances, this may have the effect of increasing the competitive pressure on some of BT's business connectivity wholesale active products, especially where these are currently subject to limited or weak competition. As a consequence, Openreach might see a reduction in its leased lines volumes which could affect BT's ability to recover its costs from regulated products.
- 2.214 In Annex 24, we illustrate the possible cost recovery implications for BT of allowing use of PIA in local access areas under a mixed usage rule. We have looked at the regulated services in the business connectivity markets which may come under greater competitive pressure as a result of relaxing PIA usage restrictions, and the costs associated with these services based on 2014/15 Regulatory Financial Statements (RFS) data. We have updated this analysis in light of stakeholder responses to the April 2017 DPA Consultation.¹⁵⁹
- 2.215 We remain of the view that the impact is likely to be relatively small within this market review period. There is a high degree of uncertainty around the potential effect on cost

¹⁵⁹ For a detailed explanation of this update, see Annex 24.

recovery, as this depends on a number of factors which are hard to predict and measure accurately. However, under a range of assumptions, our analysis suggests the effects in the short-term could be up to £16m per year, on average.¹⁶⁰ In Annex 24, we explain why we consider that this figure is likely to overstate the actual impact.

- 2.216 In the longer term, a larger proportion of leased lines could be within the reach of broadband networks deployed using PIA. The potential cost recovery implications in the longer term are harder to predict, and will depend on how the business connectivity markets and our regulation of those markets evolve over time. Illustrative analysis based on 2014/15 RFS data suggests that the cost recovery at risk could increase to up to £[X] a year.¹⁶¹ This figure does not incorporate offsetting incremental PIA rental revenues that Openreach would obtain, and we expect these to play a more significant role in the longer term as telecoms providers increasingly serve business connectivity customers in a broader geographical area.¹⁶²
- 2.217 Openreach commented that we should have explained why our views set out in the April 2017 DPA Consultation were different from our view in the 2016 BCMR Statement. In particular, Openreach noted that we rejected a duct access remedy in the BCMR because we considered it more difficult to manage the implementation risk than the dark fibre remedy.¹⁶³
- 2.218 Openreach's comment is based on a mischaracterisation of the remedy we are imposing. We are not imposing a duct access remedy in the BCMR; rather we are allowing the use of duct access where the purpose of a network deployment is primarily the delivery of broadband services. Therefore, the form of physical infrastructure access we are imposing in this WLA market review is different to the passive duct access remedy considered in the 2016 BCMR. We consider that the implementation risks of the remedy we are proposing are materially lower, since the usage and geographic restrictions constrain the extent to which a PIA-based provider can deploy leased line services. Moreover, our aim in allowing the PIA remedy to be used to deploy leased lines is different, and therefore our assessment of the benefits and risks associated with the remedy differs. In particular, we consider that it is necessary to allow mixed usage to promote greater network competition in the WLA

¹⁶⁰ This represents around 2% of the total costs recovered through regulated business connectivity services, as of 2014/15. Using Openreach's different assumptions about the relevant services at risk and their costs, this figure could be up to £[X] per year, on average, which represents around [X]% of the total costs recovered through regulated business connectivity services as of 2014/15. We discuss this in more detail in Annex 24, paragraphs A24.28 to A24.35.

¹⁶¹ This represents around [X]% of the total costs recovered through regulated business connectivity services, as of 2014/15. Using Openreach's different assumptions about the relevant services at risk and the associated common costs, this figure could be up to £[X] per year. This represents around [X]% of the total costs recovered through regulated business connectivity services, as of 2014/15. We discuss this in more detail in Annex 24, paragraphs A24.38 to A24.41.

¹⁶² Even if in the short-term telecoms providers using PIA target the very dense areas, this would not be the case in the longer term as the geographic reach of PIA-based networks increases and telecoms providers exhaust those areas with the highest concentration of business customers. Therefore, given that PIA is charged on a per meter basis, we would expect PIA rental revenues to become more significant as deployments expand geographically.

¹⁶³ Openreach referenced our views outlined in the 2016 BCMR Final Statement, paragraph 7.59, on the impracticability of setting a consistent duct access price with the active pricing structure. Openreach response to the April 2017 DPA Consultation, paragraph 91.

market. Any resulting adverse effects therefore need to be set against the very significant benefits which we expect to arise from greater network competition.

- 2.219 Openreach also expressed concerns that we had not provided a full detailed assessment of the linkage between a mixed usage PIA rule and the existing regulation in the BCMR.¹⁶⁴ In particular, Openreach considered that we should have ensured that the scope for arbitrage is limited and that the remedies are mutually consistent. It also considered that we should have conducted a full assessment of these arbitrage opportunities.¹⁶⁵
- 2.220 Our analysis outlined in Annex 24 explains our illustrative estimates of the potential impact on BT's cost recovery from losing leased line customers to a PIA-based network, as a result of the mixed usage rule. This analysis considers the potential impact of BT losing leased lines to PIA-based competitors, irrespective of the reason.
- 2.221 We acknowledge that one possible reason is that inconsistencies between the pricing of PIA and the pricing of active products could enable telecoms providers to offer some leased lines at lower cost than BT.¹⁶⁶ However, we note that this scope for arbitrage may be limited given BT has other advantages compared to a telecoms provider using PIA to deploy a new network.¹⁶⁷ We have not sought to quantify with precision the impact on BT's cost recovery resulting from such opportunities. Identifying the specific scope for arbitrage is difficult and multifaceted, since, for example, PIA may be used to deploy a network capable of serving broadband and non-broadband services and may not be a like-for-like substitute to renting an active leased line service.¹⁶⁸ Therefore, we consider that our simplified approach, which estimates the overall impact, including that which may arise from arbitrage opportunities, is sufficient for our assessment of the impact of mixed usage on BT's cost recovery in the regulated business connectivity markets. We note that Openreach did not provide evidence in its response that wide scale arbitrage opportunities would exist under a mixed usage form of PIA remedy.

¹⁶⁴ Openreach response to the April 2017 DPA Consultation, paragraph 91.

¹⁶⁵ Openreach response to the April 2017 DPA Consultation, paragraphs 91 and 303.

¹⁶⁶ The opportunity to use the PIA remedy to arbitrage leased lines may arise as a result of any differential between the PIA rental charge and the contribution Openreach's leased lines make to the recovery of duct costs on a per line basis. More generally, opportunities to arbitrage may arise from the differential between the costs faced by a telecoms provider and the costs recovered from Openreach's leased lines on a per line basis.

¹⁶⁷ For example, BT benefits from having an existing fibre connection to the building in many cases. Also, we estimate that in most cases, duct costs represent less than 3% of the total cost stack of leased line services, limiting the potential for arbitrage.

¹⁶⁸ As explained in the 2016 BCMR, there is not a one-to-one relationship between the potential duct access product and an active leased line product (or indeed the dark fibre product and a potential duct access product). A duct access product would typically be used to deploy fibre access networks (e.g. supporting both FTTP and leased line deployments within a given area) and therefore each component of a duct access product, such as a sub-duct rental for a particular duct segment, would typically contain many fibres supporting multiple services of different types. The utilisation of individual rental components would vary according to the network design and services sold. Moreover, the number and type of duct rental components utilised by individual circuits would vary depending on circuit routing through the duct network. For example, some circuits would pass through more high-utilisation segments of ducts than others. Consequently, there is not a direct relationship between the components of a duct access product and active products. BCMR Final Statement 2016, Volume 1, paragraphs 7.61 to 7.62.

2.222 We have considered how we should ensure that BT's opportunity to recover its efficiently incurred costs is not undermined.¹⁶⁹ Within this review period:

- a) The current leased lines charge control applies until 30 March 2019. We expect the impact on BT's cost recovery in 2018/19 to be small.¹⁷⁰ We do not think it is necessary to adjust the charge control specifically to take account of this. This is because we do not consider that BT's opportunity to recover its efficiently incurred costs is undermined, given the assumptions used to set the charge control over the course of the current business connectivity market review period.
- b) Subsequent to this, we are able to consider any impact on cost recovery in the next review of the business connectivity market, which we expect to take effect from April 2019.¹⁷¹

2.223 In the longer term, we will consider the most appropriate approach to ensure that BT has an opportunity to recover its efficiently incurred costs as any cost recovery impacts become clearer.¹⁷²

Impact on other end-to-end business connectivity services providers

2.224 We acknowledge that other end-to-end providers of business connectivity services may also be affected if the permitted uses of PIA are broadened. Similarly, there may be an effect on BT where it provides business connectivity services in deregulated markets. For example, these telecoms providers may face a more competitive environment in certain areas, which could affect their ability to retain some of their customers without adjusting prices. For the reasons set out above, we expect the mixed usage rule to mitigate these impacts substantially.

2.225 In its consultation response, Openreach expressed concerns that the mixed usage PIA rule would impact deregulated services and areas that are competitive, for example business connectivity services in the Central London Area (CLA).¹⁷³

2.226 In order to address our competition concerns in the WLA market effectively, our PIA remedy is applied to the WLA market in which we have found BT has SMP. We have

¹⁶⁹ In its response to the April 2017 DPA Consultation, paragraph 93, Openreach argued that if telecoms providers make extensive use of PIA under mixed usage, it would sell less Ethernet products and potentially less Dark Fibre than we envisaged in the BCMR Final Statement. Openreach explained the leased line charge control would be impacted if it sells less Ethernet services, and that there would be an effect on the feasible pattern of cost recovery.

¹⁷⁰ Under a range of plausible assumptions, our analysis suggests the impact would be less than £10m in 2018/19, but this represents an upper bound, rather than an estimated impact. Moreover, this does not factor in that the PIA remedy is not fully implemented until April 2019.

¹⁷¹ In the April 2017 DPA Consultation, we said that we would be able to consider any cost recovery shortfall in future market reviews. TalkTalk considered that accounting for cost recovery shortfall in future market reviews would be a form of retrospection we have avoided in the past. For the avoidance of doubt, we intend to consider any shortfall in cost recovery on a forward-looking basis in future market reviews, rather than make retrospective adjustments. TalkTalk response to the April 2017 DPA Consultation, paragraph 3.8.

¹⁷² Our recent 2016 BCMR Statement recognised that we would be considering allowing PIA to be used for connecting larger businesses as part of our WLA review. We said in the 2016 BCMR Statement that the impact of any such developments on business connectivity markets would also need to be taken account during the next BCMR review. 2016 BCMR Statement, paragraph 7.64.

¹⁷³ Openreach response to the April 2017 DPA Consultation, paragraph 91 and 92.

explained that to make the PIA remedy effective in supporting network deployment, it is necessary to relax usage restrictions to allow telecoms providers to fully realise the benefits from providing non-broadband services over the shared network, namely the ability to respond flexibly to future changes in demand and technological innovation and realise economies of scope. As discussed in this section, the effect of doing so may cause certain spill-over effects on leased lines markets, including those where there is no current regulation.

2.227 However, the fact that the PIA mixed usage rule has certain spill-over effects outside of the WLA market does not preclude the imposition of such a rule provided that such effects do not render the imposition of the remedy disproportionate. As explained in this sub-section, we consider that any adverse effects on the leased lines markets, including those where there is no regulation, are not disproportionate to the aim pursued.

2.228 As outlined in paragraph 2.190, Zayo and Colt argued that our mixed usage rule provides telecoms providers deploying broadband and leased lines networks using PIA with a cost advantage over telecoms providers deploying leased lines only networks. As explained above, it would be inappropriate to impose an unrestricted PIA obligation given the aim of the PIA remedy we are imposing in this market review is to address BT's market power in the WLA market. Nevertheless, we acknowledge that our mixed usage rule may have adverse effects on telecoms providers operating networks only offering leased lines.¹⁷⁴ However, we need to balance these effects against the significant benefits associated with promoting greater network competition. While we do not intend to undermine the business case of leased lines only operators, we do not consider that these adverse effects are so large as to warrant delaying the introduction of an effective infrastructure access remedy in the WLA market. As explained above, we believe the usage and geographic scope restrictions we have applied to our PIA remedy mitigate any impact, particularly within this market review period.¹⁷⁵

2.229 At the same time, infrastructure providers currently operating only in the business connectivity markets may benefit from our PIA remedy if they choose to deploy networks providing both residential broadband and high-quality business connectivity services.

Conclusion on adverse effects

2.230 Overall, we do not consider that the adverse effects are so large as to render the form of PIA remedy we are imposing disproportionate.¹⁷⁶ We believe that, taken together, the adverse effects we have identified above are likely to be outweighed by the significant benefits to consumers in the longer term arising from promoting greater network

¹⁷⁴ For example, an operator using our mixed usage PIA remedy would have a lower cost of connecting a business customer than an operator for leased lines only who had to build their own duct network.

¹⁷⁵ Moreover, as noted earlier, suppliers and customers are often reluctant to replace existing lines, and PIA may only be used where a new leased line is required.

¹⁷⁶ This conclusion is also based on the consideration of adverse effects arising from our cost recovery proposals, which is set out in Section 4.

competition. These benefits include greater choice, innovation (including innovation to increase efficiency and lower costs), stronger incentives to price keenly to attract customers and higher quality of service.¹⁷⁷

- 2.231 As set out above, in many cases the scale of any adverse effects is contingent on the scale of competitive network deployment, and so is directly linked to the scale of the benefits that result from imposing the PIA remedy.¹⁷⁸

PIA ancillary services

- 2.232 We have also considered the extent to which it is necessary to require BT to provide facilities and/or services that are necessary to enable and/or support the provision of PIA (known as PIA ancillary services).
- 2.233 A requirement to offer access to ancillary services has the purpose of assisting in promoting competition in downstream markets. Ancillary services are necessary to support the provision and use of PIA. For example, having access to sites where a telecoms provider locates its electronic equipment for the purposes of deploying a network using PIA. In the absence of a requirement to offer ancillary services, a dominant provider would have an incentive not to provide access to those ancillary services in order to render the PIA remedy ineffective.
- 2.234 The current PIA remedy includes a requirement for BT to provide such PIA Ancillary Services as may be reasonably necessary for the use of PIA. PIA Ancillary Services are defined as an associated facility or service associated with an electronic communications network and/or an electronic communications service which enable and/or support the provision of PIA services via that network and/or service or have the potential to do so. Such services are specified as including at a minimum: power, PIA Co-Location and PIA Co-Mingling (the provision of space and the ability to house equipment in a BT telephone exchange or equivalent), and PIA Site Access (access to equipment that the telecoms provider has in a BT telephone exchange or equivalent).
- 2.235 We consider that an obligation for BT to provide such ancillary services as may be reasonably necessary for the use of PIA continues to be required. We also consider that power, PIA Co-Location, PIA Co-Mingling and PIA Site Access should continue to be specified as ancillary services that BT should be required to provide. We further consider that a new ancillary service, PIA Database Access, should be specified in the network access condition. Our reasons for proposing to require PIA Database Access are set out at paragraphs 6.37 to 6.43 in Section 6 below.

¹⁷⁷ See Section 5 of Volume 1, “Approach to remedies”.

¹⁷⁸ Openreach took issue with our comment at paragraph 4.110 of the April 2017 DPA Consultation that “any impact on Openreach is justified by significant benefits to consumers in the longer run from greater network competition” (Openreach response to the April 2017 DPA Consultation, paragraph 150). To clarify, in paragraph 4.109 of that consultation, we explained why we did not expect the remedy to have significant adverse effects on Openreach. We observed in paragraph 4.110 that even if take-up of the remedy was higher than expected, such that the impact on Openreach was greater than expected, this would be matched by greater benefits resulting from greater competitive network deployment.

- 2.236 Following on from this, we have decided that BT should be required to provide such PIA ancillary services as may be reasonably necessary for such use of PIA, including as a minimum: power, PIA Co-Location, PIA Co-Mingling, PIA Site Access and PIA Database Access.

Legal tests

- 2.237 We consider that the obligation for BT to provide network access to its physical infrastructure, together with such ancillary services as may be reasonably necessary for the use of those services, is appropriate and satisfies the legal tests set out in the Communications Act 2003.
- 2.238 Section 87(3) of the Act authorises Ofcom to set SMP services conditions requiring the dominant provider to give such entitlements as Ofcom may from time to time direct as respects the provisions of network access to the relevant network, the use of the relevant network and the availability of relevant facilities.
- 2.239 In determining which conditions are authorised by section 87(3) to set in a particular case, we must take into account, in particular, the factors set out in section 87(4). In this case we consider that: the economic viability of building alternative access networks means that in the absence of regulatory intervention, it is likely there will be limited network build by telecoms providers other than BT and certainly not to the extent to make downstream markets effectively competitive; we consider that it is feasible for BT to provide the physical infrastructure access we are proposing to require and we have designed the scope of our proposed requirement with this in mind; we do not consider that our proposal will risk undermining BT's investment made by BT in its network; and we consider that our proposed network access requirement is an important element of securing economically efficient infrastructure based competition. As explained above, we have also taken account of these factors in determining the extent to which PIA includes a requirement for Openreach to make adjustments in order to make available to another user facilities and/or services for the purpose of providing electronic communications services.
- 2.240 We have considered whether our proposed condition, including the extent of the obligation imposed, is justified in light of the objectives set out in the Common Regulatory Framework, transposed into UK law under sections 3 and 4 of the Communications Act 2003.
- 2.241 We consider that the obligations we are proposing are an important element of achieving our duty in section 3 to further the interests of citizens in relation to communications matters and to further the interests of consumers in relevant markets, where appropriate by promoting competition. As explained in Section 5, Volume 1, we consider that competition in these markets would be best secured or furthered by our proposed remedy through promoting network competition. In reaching this view, we have also had regard in particular to the desirability of encouraging investment and innovation in relevant markets and the desirability of encouraging the availability and use of high speed data transfer services throughout the UK.

2.242 We have also considered all of the Community requirements set out in section 4 of the Act. We consider that our proposed condition, in particular:

- a) promotes competition in relation to the provision of electronic communications networks and electronic communications services, and the provision and making available of services and facilities that are provided or made available associated with such networks and services; and
- b) encourages the provision of network access and interoperability for the purpose of securing efficiency and sustainable competition, efficient investment and innovation and the maximum benefit for the persons who are customers of communications providers and persons who make associated facilities available.

2.243 Section 47(2) requires conditions to be objectively justifiable, not unduly discriminatory, proportionate and transparent. We consider that the proposed condition satisfies these criteria because it is:

- a) objectively justifiable, in that it facilitates and encourages access to BT's physical infrastructure networks and therefore promotes competition to the benefit of consumers;
- b) not unduly discriminatory, as the condition aims to address BT's market power in the market of the UK excluding the Hull Area, in which we provisionally consider that only BT has SMP;
- c) proportionate, in that the requirement is necessary, but no greater than necessary, to promote efficient and sustainable competition for the maximum benefit of customers of telecoms providers; and
- d) transparent, in that the condition is clear in its intention to ensure that BT provides access to its physical infrastructure and its intended operation should also be aided by our explanations in this volume.

2.244 For the reasons set out above, we consider that the proposed condition is appropriate to apply to BT to address the competition concerns identified as arising out of BT's SMP, in line with section 87(1) of the Act.

Consistency with EC Recommendations and the BEREC Common Position

2.245 In developing our measures, we have taken due account of the NGA Recommendation and utmost account of the BEREC Common Position. We consider that our proposals are broadly consistent with these measures.

2.246 The NGA Recommendation states that, where duct capacity is available, NRAs should mandate access to civil engineering infrastructure (Recommendation 13 of the NGA Recommendation). BP12(c) of the BEREC Common Position is to the same effect. The network access obligation we are imposing allows telecoms providers to access BT's physical infrastructure.

- 2.247 Recommendation 16 of the NGA Recommendation recommends that NRAs should, in accordance with market demand, encourage (or where legally possible under national law, oblige) the SMP operator, when building civil engineering infrastructure, to install sufficient capacity for other operators to make use of these facilities. While we do not propose to oblige BT to install additional capacity, our approach to relieving congested infrastructure gives BT the incentive to do so.
- 2.248 Recommendation 17 of the NGA Recommendation and BP28 of the Common Position propose the creation of a database containing information on civil engineering infrastructure. For the reasons explained in this section and in Section 6 below, we are proposing to impose a requirement on BT to establish a physical infrastructure database. We consider that the scope of the information to be included in this database is appropriate in the context of the PIA requirement that we are imposing.
- 2.249 In relation to the objective of assurance of co-location at the access point (e.g. MDF, street cabinet, concentration point) and other associated facilities, the BEREC Common Position identifies, among other things, as best practice that:
- “BP16** NRAs should impose obligations with regard to the provision of co-location and other associated facilities on a cost-oriented basis under clear rules and terms approved by the regulator to support viability of the access products mentioned above.
- BP16a** NRAs should ensure that the remedies allow the optimised use of alternative operators’ existing infrastructures.
- BP16b** NRAs should ensure that these remedies allow co-location and other associated facilities to be used efficiently. In particular, NRAs should ensure that usage is not artificially segregated by product or market.”
- 2.250 We consider that our decisions are consistent with this best practice set out in the BEREC Common Position.

3. Non-discrimination requirements

- 3.1 In this section we explain why achieving a level playing field between BT and other telecoms providers is important and how this will be achieved. Specifically, we set out our requirement on BT not to unduly discriminate in the supply of physical infrastructure access.

Our proposals

The importance of non-discrimination to ensuring a level playing field in downstream markets

- 3.2 In our April 2017 DPA Consultation we identified that ensuring a level playing field in downstream markets is necessary to ensure an effective PIA remedy. This is because without a level playing field BT could engage in practices that could distort downstream competition, including providing access, but on less favourable terms compared to those obtained by its own downstream businesses. If potential competitors do not have confidence that a level playing field will be maintained, they are unlikely to invest at scale. This could further worsen consumer outcomes as the benefits from other telecoms providers deploying ultrafast networks may not be realised.
- 3.3 Therefore, we recognised that an effective PIA remedy requires a level playing field for BT's competitors. Consequently, we considered that it is appropriate to impose some form of non-discrimination obligation on PIA network access.

A non-discrimination obligation on Openreach

- 3.4 Under the current PIA remedy BT is prohibited from discriminating unduly in relation to the provision of network access in the form of PIA in the WLA market. In our April 2017 DPA Consultation, we proposed to continue to impose this requirement on BT.
- 3.5 BT is not currently subject to a specific requirement to provide network access to PIA on an Equivalence of Inputs (EOI) basis.¹⁷⁹ This recognised that EOI may not be appropriate in circumstances where network access involves legacy products and processes which might need to be re-engineered to meet the requirement. In our April 2017 DPA Consultation, we remained of the view that requiring BT to use PIA for all products and services that consume duct access in the WLA market would not be proportionate at this stage.
- 3.6 However, we proposed to interpret the requirement not to discriminate unduly as requiring strict equivalence in respect of all processes and sub-products that contribute to

¹⁷⁹ An EOI obligation is a strict form of non-discrimination obligation. An EOI product has to be provided on the same timescales, terms and conditions (including price and service levels) by means of the same systems and processes, which includes the provision of the same commercial information.

the supply and consumption of duct access, unless BT could demonstrate that a difference in respect of a specific process step or sub-product is justified.

Transparency and KPIs

- 3.7 Given the importance of non-discrimination in creating an environment in which competing providers have the confidence to make substantial capital investments relying on access to BT's duct and pole network, we proposed an obligation on BT to provide transparency around non-discrimination. Specifically, we sought to impose a requirement on BT to publish such information on non-discrimination as we may direct.
- 3.8 We indicated that we would consider whether to propose key performance indicators (KPIs) on non-discrimination once Openreach has published its revised Reference Offer. We envisaged that such KPIs would require BT to publish data necessary to allow the comparison of the supply and consumption of duct access by external telecoms providers, as compared to Openreach's own internal consumption.

Stakeholder responses

- 3.9 Most stakeholders¹⁸⁰ (including Openreach)¹⁸¹ supported our proposed non-discrimination obligation in principle, at least for the time being. Several of these stakeholders also expressed their desire for an eventual implementation of EOI in the future.¹⁸² Other stakeholders insisted that strict EOI should nevertheless be implemented immediately, although these points related specifically to the application of EOI in order to remove existing usage restrictions.¹⁸³

Equivalence of Inputs (EOI)

- 3.10 Many stakeholders recognised that given the issues we identified, an obligation to implement strict EOI immediately may not be proportionate. CityFibre agreed that "strict EOI would be difficult, time consuming and costly to implement".¹⁸⁴ Furthermore, Hyperoptic commented that while the implementation of EOI would be ideal, it "appreciates the negative impact to current products and processes and performance".¹⁸⁵ Sky commented that while not implementing EOI appeared to deviate from our proposals

¹⁸⁰ Flomatik response to the April 2017 DPA Consultation, page 4; [3<]; TalkTalk response to the April 2017 DPA Consultation, paragraphs 4.1 to 4.2; [3<], WarwickNet response to the April 2017 DPA Consultation, page 1; Hyperoptic response to the April 2017 DPA Consultation, page 10; CityFibre response to the April 2017 DPA Consultation, paragraph 7.1.18; the PAG response to the April 2017 DPA Consultation, paragraph 41 and BUUK response to the April 2017 DPA Consultation, page 1. Sky response to the 2017 WLA Market Review Consultation, paragraph A5.8.

¹⁸¹ Openreach response to the April 2017 DPA Consultation, paragraph 192.

¹⁸² The PAG response to the April 2017 DPA Consultation, paragraphs 46 to 57; Vodafone response to the April 2017 DPA Consultation, paragraph 20; Hyperoptic response to the April 2017 DPA Consultation, page 11; and TalkTalk response to the April 2017 Consultation, paragraph 4.1.

¹⁸³ INCA responses to April 2017 DPA Consultation; page 6; Zayo response to the April 2017 DPA Consultation, pages 9 to 10. These points are addressed in Section 2.

¹⁸⁴ CityFibre response to the April 2017 DPA Consultation, paragraphs 6.3.1 to 6.3.4 and 7.1.18.

¹⁸⁵ Hyperoptic response to the April 2017 DPA Consultation, page 10.

in the Strategic Review, it recognised that enforcing an EOI obligation may not be proportionate.¹⁸⁶ TalkTalk described our proposals as “pragmatic”, but emphasised that our position should not prevent us from achieving EOI wherever possible and moving to full EOI in the long run.¹⁸⁷

- 3.11 The PAG mentioned that while it “reluctantly” accepts that EOI is not to be implemented immediately, it insisted there should be a plan to require Openreach to deliver EOI in the long-term and we should commit to the phased delivery of EOI over time.¹⁸⁸ It believed that there should be a “roadmap to EOI”, for which any exceptions to EOI are to be clearly defined and only permitted for a specified period, with Openreach also being required to have a plan in place to deliver EOI at the end of the period.¹⁸⁹
- 3.12 The PAG asserted that EOI could not be disproportionate indefinitely, arguing that if there is to be competition on passive remedies the costs of EOI will need to be incurred at some stage.¹⁹⁰ The PAG also objected to the citation of time and cost considerations as reasons for not implementing EOI without having first carried out a detailed assessment.¹⁹¹ The PAG highlighted other jurisdictions, where it stated various NRAs (‘national regulatory authorities’) had either imposed EOI or were moving towards EOI.¹⁹²
- 3.13 The PAG also remarked that given much work is undertaken by Openreach contractors, EOI should be implemented in relation to the activities that they currently undertake, with DPA users being permitted the same flexibility as Openreach’s contractors.¹⁹³
- 3.14 [S<] noted it “broadly agreed” with the imposition of a no undue discrimination obligation on BT, although it considered that Openreach’s own use of ducts and poles for current and future products should be on an equivalent basis to consumers of PIA. It remarked that any re-engineering of BT legacy products would be no more burdensome than the processes other telecoms providers have to go through.¹⁹⁴
- 3.15 Openreach agreed that it should not be required to consume PIA on an equivalent basis, commenting that to do otherwise would create operational inefficiencies and affect existing services, as well as future deployment.¹⁹⁵
- 3.16 Openreach supported our proposal to not apply EOI to new Openreach activities (namely ultrafast networks), remarking there would be risks of increased costs, complexity and inefficiency. It also agreed with our assessment of the difficulties of introducing a second form of functional separation in Openreach, between active and passive products.¹⁹⁶

¹⁸⁶ Sky response to 2017 WLA Consultation, paragraph A5.8.

¹⁸⁷ TalkTalk response to the April 2017 DPA Consultation, paragraph 4.1.

¹⁸⁸ The PAG response to the April 2017 DPA Consultation, paragraphs 46 to 53, 56.

¹⁸⁹ The PAG response to the April 2017 DPA Consultation, paragraphs 47 to 48.

¹⁹⁰ The PAG response to the April 2017 DPA Consultation, paragraphs 53 to 54.

¹⁹¹ The PAG response to the April 2017 DPA Consultation, paragraph 54.

¹⁹² The PAG response to the April 2017 DPA Consultation, paragraph 55.

¹⁹³ The PAG response to the April 2017 DPA Consultation, paragraph 57.

¹⁹⁴ [S<] response to the April 2017 DPA Consultation, page 7.

¹⁹⁵ Openreach response to the April 2017 DPA Consultation, paragraph 190.

¹⁹⁶ Openreach response to the April 2017 DPA Consultation, paragraph 196.

- 3.17 Some stakeholders disagreed with our approach to future ultrafast rollout. The PAG expected that any future ultrafast deployment should be based on EOI.¹⁹⁷ It disputed that requiring EOI for such products would require complex boundaries, arguing that allowing full-fibre on a non-EOI basis would only result in costly “retro-fitting” of EOI processes later.¹⁹⁸ Zayo also thought EOI should be applied to Openreach’s future G.fast and full-fibre deployments.¹⁹⁹
- 3.18 CityFibre considered that if Openreach (or BT Group) participated in a co-investment group, then network build undertaken by that group should use the external PIA products, services and interfaces. It remarked that “allowing a BT co-investment vehicle to not be subject to full EOI would be discriminatory and anti-competitive”.²⁰⁰

No undue discrimination requirement

- 3.19 The PAG stated it was unclear on the extent to which the proposed strict non-discrimination requirement requires changes to current Openreach processes and how it would compare to the “ineffective status quo”. It considered that there should be strict equivalence, except in “specific circumstances where Ofcom has set out defined and transparent exceptions”.²⁰¹
- 3.20 The PAG considered that Openreach and Ofcom should: (i) set out the entire end-to-end process for which Openreach uses its passive infrastructure; (ii) identify specific points where terms of access are different; and (iii) explain and justify these differences. It felt that the findings from this analysis should form part of BT’s SMP conditions.²⁰² The PAG elaborated that all the exceptions to equivalence identified by comprehensive review must be first justified by Openreach, then be subjected to consultation and then independently assessed by Ofcom.²⁰³
- 3.21 TalkTalk agreed with our proposal, but wanted clarity on what the non-discrimination condition would mean in practice.²⁰⁴
- 3.22 Openreach commented that it did not object to the no undue discrimination condition, although it interpreted the condition as having regard to whether there is *material*

¹⁹⁷ The PAG response to the April 2017 DPA Consultation, paragraphs 58 to 60.

¹⁹⁸ The PAG response to the April 2017 DPA Consultation, paragraph 59.

¹⁹⁹ The PAG response to the April 2017 DPA Consultation, page 10.

²⁰⁰ CityFibre response to the April 2017 DPA Consultation, paragraph 7.1.18

²⁰¹ The PAG response to the April 2017 DPA Consultation, paragraphs 38 to 39 and 43.

²⁰² The PAG response to the April 2017 DPA Consultation, paragraph 42.

²⁰³ The PAG response to the April 2017 DPA Consultation, paragraph 62.

²⁰⁴ TalkTalk response to the April 2017 DPA Consultation, paragraph 4.2.

*disadvantage*²⁰⁵ and the extent to which equivalence is implemented “as far as practicable”.²⁰⁶

- 3.23 Openreach commented it would need to carry out analysis on all potential areas of its processes that may be covered by the no undue discrimination obligation. It set out a non-exhaustive list of areas where it expected there to be differences between Openreach use and the PIA product.²⁰⁷ Openreach considered that the voluntary steps it took earlier in 2017 to release its Digital Maps for DPA users to be an “excellent example” of the flexibility of a no undue discrimination obligation compared to an inflexible EOI obligation.²⁰⁸
- 3.24 Openreach objected to the application of the no undue discrimination obligation to our cost recovery proposals.²⁰⁹
- 3.25 Openreach remarked that it was “unclear” if any future processes and platforms could be designed and implemented in a fully equivalent way, without there being similar costs and complexities that we noted for the introduction of strict equivalence on all products.²¹⁰ Openreach appeared to argue that its ability to innovate its network and develop products could be reduced if new processes and platforms were subject to equivalence. It remarked that it should be able to develop new and efficient plan and build techniques “without being held back” by the need to make these available to other telecoms providers. It considered that to do so would put Openreach at a competitive disadvantage, reduce its incentives to innovate and would be disproportionate.²¹¹
- 3.26 Vodafone stated that when BT launches its new processes and systems, these should be launched on EOI terms.²¹²

Transparency and KPIs

- 3.27 The PAG stated that there should be an upfront direction requiring BT to publish KPIs, which should contain figures on Openreach’s performance for DPA customers and the comparative measures for Openreach’s own services. It considered that KPIs will impose the transparency required to identify potential problems and incentivise BT to be equivalent.²¹³

²⁰⁵ While in our 2016 PIA Consultation we considered applying equivalence with the aim of no material disadvantage, Openreach is incorrect in its view that our April 2017 DPA Consultation proposals did not qualify any disadvantage as having to be *material*. Our proposals simply stated that other telecoms providers are not at “a disadvantage”. See our April 2017 DPA Consultation, paragraphs 5.29 and 5.38.

²⁰⁶ Openreach response to the April 2017 DPA Consultation, paragraph 192.

²⁰⁷ Openreach response to the April 2017 DPA Consultation, paragraph 197.

²⁰⁸ Openreach response to the April 2017 DPA Consultation, paragraphs 193 to 195.

²⁰⁹ Openreach response to the April 2017 DPA Consultation, paragraph 202. Openreach’s comments in relation to our cost recovery proposals are covered in greater detail in Section 4.

²¹⁰ Openreach response to the April 2017 DPA Consultation, paragraph 198.

²¹¹ Openreach response to the April 2017 DPA Consultation, paragraphs 193 and 198 to 199.

²¹² Vodafone response to the April 2017 DPA Consultation, paragraph 20.

²¹³ The PAG response to the April 2017 DPA Consultation, paragraphs 64 to 68.

- 3.28 The PAG outlined that KPIs should cover the timelines for providing information required for planning, information on services provided by Openreach and details on Openreach’s maintenance activities.²¹⁴ The PAG also suggested that we implement KPIs that are similar to those used in France and Spain²¹⁵, as outlined in the WIK-Consult report commissioned by Vodafone.²¹⁶ Vodafone similarly considered that KPIs should be imposed as part of the Statement and provided the example of the KPI reporting used for DPA in France.²¹⁷
- 3.29 TalkTalk expressed concern that the cumulative effect of numerous minor infractions of the non-discrimination rule could result in DPA users being materially disadvantaged.²¹⁸ It therefore stressed the need for transparency of BT’s processes and suggested that arrangements should be made to monitor BT’s compliance with the rule. Furthermore, it considered that the Statement should contain firm proposals for the transparency obligation and KPIs (even if these need to be confirmed only after the Reference Offer is finalised).²¹⁹ [S<] also supported the imposition of a transparency obligation and urged us to commit to the imposition of a KPI regime.²²⁰

Our reasoning and decisions

- 3.30 Non-discrimination can have different forms of implementation. A strict form of non-discrimination – i.e. a complete prohibition of discrimination – would result in the SMP operator providing 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. This would be an EOI obligation, which removes any degree of discretion accorded to the nature of the conduct. However, in certain cases, a less strict interpretation of non-discrimination may be appropriate, to allow for flexibility and a more practical or cost-effective provision of wholesale inputs.
- 3.31 We explain in Volume 1 that we are imposing certain non-discrimination obligations on BT, specifically an EOI obligation and a no undue discrimination obligation; these obligations are complementary to the network access obligation.²²¹ We are therefore concerned here with whether it is appropriate to apply these non-discrimination obligations in relation to PIA.
- 3.32 As discussed above, without a level playing field in relation to PIA, BT could engage in practices that could distort downstream competition, including providing access, but on

²¹⁴ The PAG response to the April 2017 DPA Consultation, paragraph 68. For example, the PAG stated there should be timeframes for any step in the process reliant on Openreach approval or the provision of enabling works by Openreach. Furthermore, it considered that fault repair KPIs should be based on figures it is required to report for Ethernet products and should also cover timings related to faults.

²¹⁵ The PAG response to the April 2017 DPA Consultation, paragraph 69. The PAG sets out the KPIs used in France, which include average delivery times for providing information, escorting by Orange agents and key loaning.

²¹⁶ WIK-Consult (commissioned by Vodafone), 19 April 2017. ‘Best practice for passive infrastructure access’, page 29.

²¹⁷ Vodafone response to the April 2017 DPA Consultation, paragraphs 23 to 24.

²¹⁸ TalkTalk response to the April 2017 DPA Consultation, paragraph 4.1.

²¹⁹ TalkTalk response to the April 2017 DPA Consultation, paragraphs 4.2 to 4.3.

²²⁰ [S<] response to the April 2017 DPA Consultation, page 8.

²²¹ See Volume 1, paragraph 6.88 to 6.101

less favourable terms compared to those obtained by its own downstream businesses. This could further worsen consumer outcomes as the benefits from other telecoms providers deploying ultrafast networks may not be realised.

- 3.33 Imposing a non-discrimination requirement on BT in relation to PIA would help address this competition problem. Among other reasons, this is because an effective PIA remedy requires other telecoms providers to choose to compete with BT downstream, while also relying on BT to provide upstream duct access that will enable this competition. Since this leads to a conflict in incentives for BT, other telecoms providers need to have confidence that they can use PIA on fair terms. Without confidence that a level playing field will be maintained these potential competitors are unlikely to invest at scale.
- 3.34 Therefore, an effective PIA remedy requires BT being prevented from discriminating, on both a price and non-price basis. This will help ensure a level playing field on which other telecoms providers can compete with BT. Consequently, we consider that it is appropriate to impose some form of non-discrimination obligation on PIA.
- 3.35 Our starting point is that to achieve a level playing field it is necessary to impose broad equivalence. However, in imposing a non-discrimination remedy and ensuring other telecoms providers are not at a disadvantage to BT, we need to take care that the remedy itself is not so costly or disruptive to BT, or takes so long to impose, that the remedy fails to level the playing field, or even tilts it the other way. We consider below the precise form of non-discrimination obligation which is appropriate to impose on PIA in the context of this market.

Equivalence of inputs

- 3.36 We consider that a non-discrimination obligation in the form of EOI is the most appropriate form of non-discrimination obligation to impose where there are concerns that a dominant provider will discriminate in respect of network access. This is because EOI generates better incentives on the dominant undertaking to improve the products it offers to its competitors, and it increases transparency. It therefore offers greater potential to address the issue of inequality of access in a sustainable fashion.
- 3.37 As explained in the 'General Remedies' section of Volume 1, we have concluded that EOI is the most effective non-discrimination remedy and we believe it to be proportionate to reimpose an EOI condition on BT where it already provides access services on an EOI basis.²²²
- 3.38 However, because EOI does not allow any discrimination at all, it may not be appropriate in circumstances where network access involves legacy products and processes which might need to be re-engineered to meet the requirement.
- 3.39 We have decided that extending the application of the strict EOI obligation we are imposing on BT (see Volume 1) in relation to PIA would not be appropriate at this time,

²²² 2018 WLA Statement, Volume 1, paragraphs 6.97 to 6.99.

given the cost, disruption and time involved in Openreach re-engineering its existing legacy processes and systems in order to comply with the obligation. As already noted, most stakeholders agreed that the difficulties involved in implementing a strict EOI obligation would make an immediate obligation disproportionate and we have not received any compelling reasons to the contrary.²²³

- 3.40 Consequently, we have considered the extent to which a more limited form of non-discrimination obligation might be appropriate to be applied to PIA.
- 3.41 One possibility would be to apply EOI for a specific sub-set of BT's activities on a forward-looking basis. This would mean imposing EOI but limiting its application only to BT's consumption of duct and pole access for deploying new ultrafast broadband networks. However, we have several concerns with such an approach:
- a) First, potentially complex boundaries may be needed inside Openreach to ensure EOI is applied appropriately. In particular, we see the need for a boundary between the supply of duct access for ultrafast broadband services and for other products, and an additional boundary between downstream ultrafast broadband products and other Openreach products. These boundaries could lead to complexity and the risk of regulatory failure. Furthermore, monitoring compliance of these boundaries could be difficult.
 - b) Second, we believe that there is a risk the incentives EOI introduces will differ between BT and other telecoms providers. This is because BT's own demand for a duct access product to support full-fibre deployment is not fully established. Therefore, BT and other telecoms providers may not have aligned requirements for a workable duct access product. This may undermine the effectiveness of the EOI requirement. Furthermore, in such a situation, an EOI requirement may even incentivise BT to reduce the deployment of its own full-fibre services compared to what might otherwise have been the case.
- 3.42 For these reasons, we have decided that EOI should not automatically apply to Openreach's forward looking products, namely the deployment of full-fibre and G.fast.
- 3.43 We disagree with the PAG's assertion that not applying EOI to ultrafast products would ultimately mean such products could never be required to be equivalent, due to the costs of 'retro-fitting'.²²⁴ Even though we will not be applying EOI, any new processes or systems used in the deployment of ultrafast products will be expected to be equivalent with PIA, unless differences can be justified by Openreach (as explained below). Given this, we expect that in the long-run, future ultrafast products deployed by Openreach will be done

²²³ INCA response April 2017 DPA Consultation, page 6; Zayo response to the April 2017 DPA Consultation, pages 10 to 11. INCA and Zayo insisted that strict equivalence should be applied. This is principally in order to remove any usage restrictions that PIA users face (which Openreach does not). The reasoning behind the imposition of the mixed usage rule is addressed in Section 2.

²²⁴ The PAG response to the April 2017 DPA Consultation, paragraph 59.

so on a largely equivalent basis, and that the costs of retro-fitting at this point will not prohibit the imposition of EOI.

- 3.44 Furthermore, although CityFibre agreed that EOI would be “difficult, time consuming and costly to implement”, it expressed the view that any co-investment arrangement that Openreach makes with third parties should be subject to full EOI.²²⁵ For the reasons we outline above, we maintain our view that EOI is not appropriate for Openreach’s forward looking products, including those deployed under a co-investment arrangement with a third party. These deployments will nevertheless be subject to the no undue discrimination obligation, meaning that equivalence will be required, unless it can be otherwise justified.²²⁶

No undue discrimination requirement

Strict equivalence, unless Openreach can justify otherwise

- 3.45 We have therefore decided to extend the application of the no undue discrimination SMP condition we are imposing on BT (see Volume 1) in relation to PIA. Although this falls short of the strict equivalence of EOI, we have decided that in order to ensure a level playing field in downstream markets, this non-discrimination requirement should be as close to EOI as possible.
- 3.46 Therefore, we will interpret the no undue discrimination SMP condition in relation to PIA as requiring strict equivalence in respect of all processes and sub-products that contribute to the supply and consumption of duct access, with discrimination permitted only in cases where BT demonstrates that a difference in respect of a specific process step or sub-product is justified.
- 3.47 Where Openreach can justify any processes or systems used by PIA users as being different from those used by Openreach, the condition would still require these to be broadly equivalent. This means that any difference must not put PIA users at a disadvantage, particularly in terms of extra cost, time or uncertainty, compared to the processes Openreach follows internally.
- 3.48 We do not consider it to be necessary for us to set out all potential areas of Openreach’s processes which may be covered by the no undue discrimination obligation, as suggested by Openreach²²⁷, as all processes associated with physical infrastructure access are to be covered by the obligation.
- 3.49 While this non-discrimination obligation applies to Openreach network deployments that are within the WLA market, in the Business Connectivity Market Review 2016 (BCMR 2016) we set out our intention to move towards a future model in which competition will be

²²⁵ CityFibre response to the April 2017 DPA Consultation, paragraphs 6.3.1 to 6.3.4 and 7.1.18.

²²⁶ However, to the extent that any form of co-investment by Openreach and another telecoms provider might be restricted by such an obligation, there is scope for us to disapply the obligation in appropriate circumstances.

²²⁷ Openreach response to the April 2017 DPA Consultation, paragraph 197.

based on passive access. We also set out that any work undertaken under the review of the WLA market will be taken into account in our next BCMR review.²²⁸

- 3.50 In the event that we impose a broader duct access remedy in a future market review which impacts markets outside WLA, it may be appropriate to impose a similar non-discrimination remedy in these other markets. This would therefore require that access to physical infrastructure is available to access seekers on an equivalent basis to Openreach, unless any difference can be justified. When Openreach produces any new processes or systems related to use of its physical infrastructure, we will expect it to consider how these could be used by access seekers on an equivalent basis, given the potential for the non-discrimination requirement to be extended to other markets in the future.

Equivalence for new processes and platforms

- 3.51 Applying the no undue discrimination obligation on PIA will mean that when BT establishes new processes or platforms that contribute to the supply and consumption of duct access, these should be designed and implemented from the outset such that they are equivalent. We envisage that new platforms and/or processes used by BT would not differ from those used by other telecoms providers, other than in the most exceptional circumstances.²²⁹
- 3.52 We do not find any merit in Openreach's argument that no future processes and platforms could be designed and implemented in a fully equivalent way without the same adverse effects of demanding strict equivalence on all products. We consider that making new processes equivalent from the outset will not involve the same level of significant cost, disruption and time as associated with re-engineering existing legacy processes. Therefore, differences are far less likely to be justified, compared to the differences that could continue to exist for current legacy processes and platforms.
- 3.53 Furthermore, we disagree with Openreach's argument that future processes should not be equivalent because doing so will place Openreach at a competitive disadvantage. This condition aims to reassure other telecoms providers that Openreach is not able to distort downstream competition (such that PIA users have access on less favourable terms). Denying PIA users the benefits of innovative techniques which Openreach uses for itself will inevitably place other telecoms providers at a disadvantage. Such exclusive use of new processes by Openreach cannot therefore be permitted.
- 3.54 Given that we expect future processes and platforms to be equivalent as default (unless justified otherwise), we do not consider it necessary to set out a long-term plan for the phased delivery of full EOI, as argued by the PAG.²³⁰

²²⁸ 2016 BCMR Statement, Volume 1, paragraphs 1.34 and 1.40.

²²⁹ On 1 February 2018, Openreach announced a further investment in full-fibre, with a proposal to deploy full-fibre to 3m premises by 2020. We would expect that the processes and platforms that are developed to support this programme are done so on a strictly equivalent basis, unless differences can be justified.

<http://news.openreach.co.uk/pressreleases/london-leads-the-uk-in-major-new-drive-for-ultrafast-broadband-as-openreach-launches-fibre-first-programme-2400491> [accessed 8 February 2018].

²³⁰ The PAG response to the April 2017 DPA Consultation, paragraphs 46 to 53 and 56.

Equivalence in pricing

- 3.55 Under this non-discrimination obligation, when Openreach charges itself internal transfer charges, it must do so in a manner that is consistent with the charging principles that it applies to determine charges faced by telecoms providers using PIA, to the extent that a different approach cannot be justified.²³¹ These internal transfer charges would then be relevant to any subsequent assessment of whether Openreach's prices for the relevant downstream services are appropriate. Our decisions on cost reporting (set out in Annex 8) will support our ability to monitor whether Openreach is complying with this aspect of the non-discrimination obligation.

Compliance with the no undue discrimination obligation

- 3.56 As outlined above, although we expect Openreach to be able to justify any instances of non-equivalence, we do not consider it necessary for Openreach to set out the entire end-to-end process on how passive infrastructure is used (with differences being individually identified and justified). We are not imposing an upfront obligation on Openreach to justify all instances of non-equivalence.
- 3.57 Instead, we are putting in place an ongoing monitoring programme to ensure Openreach complies with the non-discrimination obligation. As part of this we will be working with the Office of the Telecoms Adjudicator (OTA) and access seekers, in order to evaluate their experience of the PIA product. We will also make use of our information gathering powers, as well as the new financial reporting requirements imposed on Openreach, in order to evaluate any PIA processes that are at risk of failing to be equivalent (with no justification for any difference). Furthermore, we will take forward investigations appropriately, following complaints of non-equivalence from other telecoms providers.

Transparency and KPIs

- 3.58 Given the importance of non-discrimination in this context, in particular, in creating an environment in which competing providers have the confidence to make very substantial capital investments relying on access to BT's duct and pole network, we consider that we should impose an obligation on BT to provide transparency around non-discrimination in relation to PIA. Specifically, we have decided to impose a requirement on BT to publish such information on non-discrimination in relation to PIA as we may direct.
- 3.59 We have considered whether we should impose specific KPIs on non-discrimination as part of our decisions, including a requirement to publish data necessary to allow the comparison of the supply and consumption of duct access by external telecoms providers as compared to Openreach's own internal consumption.

²³¹ For example, if Openreach undertakes network adjustments to support BT's own Full-Fibre deployments but does not consume the PIA product, it should still charge itself internal transfer charges which are consistent with the charges for network adjustments faced by competing telecoms providers using PIA (to the extent that a different approach cannot be justified).

- 3.60 While we note the comments from stakeholders that KPIs or specific transparency obligations should be imposed as part of this statement,²³² we continue to consider that it is inappropriate to impose any specific transparency obligations on Openreach at this time. Instead, we will consider what requirements (if any) it might be appropriate for BT to report as KPIs once Openreach has published a revised internal Reference Offer covering all the requirements we are imposing in this statement (i.e. after the 1 April 2019).
- 3.61 This is because we will be better placed to identify what aspects of the PIA process are the most relevant to indicating the performance of the PIA product as that Reference Offer is developed. These aspects can then be appropriately compared with measures concerning Openreach's own internal consumption.
- 3.62 Furthermore, once a Reference Offer covering all the requirements we are imposing in this statement is in place, we expect there to be a number of changes to the PIA ordering and deployment process in order to support the SLA / SLG regime. We therefore believe that the choice of KPIs to assess compliance with non-discrimination can be best made when the changes to processes are agreed between access seekers and Openreach.
- 3.63 We do not expect to impose any specific transparency obligations on Openreach until a Reference Offer covering all the requirements we are imposing in this statement is implemented. However, as mentioned above, we will be monitoring Openreach's compliance with this non-discrimination obligation.

Legal tests

- 3.64 For the reasons set out in Volume 1, we are satisfied that the no undue discrimination condition for BT in the WLA market in the UK (excluding the Hull Area), which we will apply in respect of PIA, meets the various tests set out in the Act.²³³

Consistency with EC Recommendations and the BEREC Common Position

- 3.65 As set out in the 'General Remedies' section of the 2018 WLA Statement Volume 1²³⁴, we have taken due account of the EC's Costing and Non-discrimination Recommendation in reaching our decision to impose a no undue discrimination condition on BT.²³⁵ There are three recommendations particularly relevant in respect of how we have decided to apply the non-discrimination condition to PIA:
- a) that where EOI is disproportionate, National Regulatory Authorities (NRAs) should ensure that the SMP operator provides wholesale inputs on at least an EEO basis;

²³² The PAG response to the April 2017 DPA Consultation, paragraphs 64 to 69; Vodafone response to the April 2017 DPA Consultation, paragraphs 23 to 24; TalkTalk response to the April 2017 DPA Consultation, paragraphs 4.1 to 4.3.

²³³ Volume 1, paragraph 6.107 to 6.111.

²³⁴ Volume 1, paragraph 6.112 to 6.113.

²³⁵ *Commission recommendation of 11 September 2013 on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment (C(2013) 5761)*. (September 2013 EC Recommendation on non-discrimination obligations). http://ec.europa.eu/smart-regulation/impact/ia_carried_out/docs/ia_2013/c_2013_5761_en.pdf.

- b) that NRAs should ensure that when a non-discrimination obligation is imposed, access seekers can use the relevant systems and processes with the same degree of reliability and performance as the SMP operators' own downstream retail arm; and
 - c) that NRAs should require SMP operators subject to a non-discrimination obligation to provide access seekers with regulated wholesale inputs, which allow the access seeker to effectively replicate technically new retail offers of the downstream retail arm of the SMP operator, in particular where EOI is not fully implemented.
- 3.66 We consider that the no undue discrimination obligation which we are imposing is consistent with these recommendations.
- 3.67 Point 19 of that recommendation also provides that when imposing non-discrimination obligations, NRAs should impose KPIs in order to monitor effectively compliance with the non-discrimination obligation. As outlined above, we have decided to impose a non-discrimination obligation and a power to impose KPIs. While we are not currently implementing KPIs relating to the PIA obligation, we will consider what requirements (if any) it might be appropriate for BT to report as KPIs once Openreach has updated the relevant Reference Offer to cover all the requirements we are imposing in this statement.
- 3.68 We have also taken utmost account of the BEREC Common Position. In relation to achieving the objective of a level playing field, the BEREC Common Position identifies, among other things, as best practice that:²³⁶
- “BP19 NRAs should impose an obligation on SMP CPs requiring equivalence, and justify the exact form of it, in light of the competition problems they have identified.*
- BP19a NRAs are best placed to determine the exact application of the form of equivalence on a product-by-product basis. For example, a strict application of EOI is most likely to be justified in those cases where the incremental design and implementation costs of imposing it are very low (because equivalence can be built into the design of new processes) and for certain key legacy services (where the benefits are very high compared to the material costs of retro-fitting EOI into existing business processes). In other cases, EOO would still be a sufficient and proportionate approach to ensure non-discrimination (e.g. when the wholesale product already shares most of the infrastructure and services with the product used by the downstream arm of the SMP operator).”*
- 3.69 We have further taken due account of the EC's 2010 NGA recommendation.²³⁷ Point 13 of the recommendation provides that where duct capacity is available, NRAs should mandate access to civil engineering infrastructure and this access should be provided in accordance

²³⁶ In this respect, the BEREC Common Position identifies the following competition issues which arise frequently: SMP players having an unfair advantage; having unmatchable advantage, by virtue of their economies of scale and scope, especially if derived from a position of incumbency; discriminating in favour of their own group business (or between its own wholesale customers), either on price or non-price issues; exhibiting obstructive and foot-dragging behaviour.

²³⁷ EC, October 2010, Commission Recommendation 25.9.2010 on regulated access to Next Generation Access Networks (NGA) (2010 EC Recommendation on NGA). <http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32010H0572&from=EN>.

with the principle of equivalence as set out in Annex II. While we are to interpret the non-discrimination obligation as requiring strict equivalence, differences are permitted where it can be demonstrated that it strict equivalence is not justified. To the extent that this means that PIA is provided on terms falling short of the principle of equivalence, we consider that this is justified by UK national circumstances for the reasons set out in this section.

4. Recovery of PIA related costs

- 4.1 In this section, we set out how certain costs incurred by Openreach in relation to the provision of PIA should be recovered. We consider recovery of the following two categories of cost:
- a) Network adjustment costs: costs which Openreach will incur in making adjustments to its network where this is necessary for its physical infrastructure network to be available to telecoms providers for the purpose of deploying their own networks.
 - b) ‘Productisation’ costs: costs which Openreach incurs in setting up and managing the PIA product, and processing PIA orders.

Recovery of network adjustment costs

- 4.2 In Section 2, we explain that the PIA network access obligation should include a requirement on Openreach to make certain adjustments to its network. This will promote network competition by realising greater efficiency benefits from sharing BT’s existing physical infrastructure and ensuring a level playing field with Openreach. In this sub-section, we consider how Openreach should recover the costs of making network adjustments required as part of the PIA network access obligation.

Our proposals

- 4.3 In our April 2017 DPA Consultation, we explained that Openreach’s current approach of charging the telecoms provider the full cost of adjustments undermines the effectiveness of the PIA remedy as it is inconsistent with the way Openreach recovers the costs of network adjustments undertaken to accommodate BT’s own network deployment. Openreach recovers the costs of adjustments required to support BT’s network deployment across all users of the infrastructure and therefore products in which it has SMP. We considered that this reduces the risk associated with BT’s network investments, relative to the risk associated with competitive network investment, giving BT an unmatchable competitive advantage. We considered that this could undermine incentives to invest in competing networks.²³⁸
- 4.4 In addition, we identified a number of other factors that mean the current approach to cost recovery adds to the cost and risk faced by telecoms providers when deploying their networks, and therefore acts as a barrier to competitive network investment at scale:
- a) the current approach means that telecoms providers will often have to pay for infrastructure that they do not fully utilise but can be used by BT in future;
 - b) Openreach has the incentive and ability to increase costs to rival telecoms providers by choosing how network adjustments are provided;

²³⁸ April 2017 DPA Consultation, paragraphs 7.41 to 7.44.

- c) the costs of network adjustments faced by competing telecoms providers will be uncertain, increasing the risk associated with the business case for network deployment; and
 - d) under the current approach, not only do telecoms providers pay the full cost of the adjustments they require, they also contribute to the cost of any network deployments required to support BT's network adjustments through PIA rental charges.
- 4.5 We proposed that Openreach should recover the costs of network adjustments for other telecoms providers in the same way it has adopted historically, and adopts currently, in relation to BT's network deployment i.e. over all users of the infrastructure. This would ensure that telecoms providers are not at a disadvantage to BT, and therefore would support competitive investment. We said that this approach would also reflect the fact that duct and pole infrastructure is a shared asset which benefits a range of downstream services, and would also reduce barriers to competitive network investment by reducing the cost and risk associated with building a rival network using PIA.
- 4.6 We recognised that there was uncertainty around the total costs of network adjustments Openreach would be required to recover across all users of the physical infrastructure and, as a result, our proposed approach to cost recovery could have a greater impact on Openreach and consumers than we anticipated. In addition, we recognised that telecoms providers may have a greater incentive to request changes to the physical infrastructure, given they would not face the full cost of these network adjustments. To mitigate this risk, we proposed to apply a financial limit on the network adjustment costs that Openreach should be required to recover in this way. This would mean Openreach would recover the costs of network adjustments up to the financial limit from all users of the infrastructure, and any costs incurred above the financial limit would then be recovered directly from the telecoms provider requesting the network adjustment, through ancillary charges.
- 4.7 In our August 2017 DPA Consultation, we set out our proposals for setting the financial limit related to network adjustments:
- a) We explained that it is not possible to estimate the incidence of all network adjustments with any degree of precision. In order to set an appropriate financial limit, we proposed to use our estimates of the costs and incidence of adjustments that we considered are clearly in scope. In making such estimates, we used a higher figure than our estimate of average costs of these adjustments, for two reasons. First, to capture typical or normal adjustment costs that are above the average, recognising there is a distribution of costs. Second, to provide some allowance for other in-scope adjustments, where the case specifics are more important in determining whether the adjustment falls within the scope of the remedy.
 - b) We considered that the financial limit should be based on the scale of the deployment using PIA, and applied to each order on a per kilometre basis. We also proposed that the financial limit should apply in aggregate to all reasonable adjustments within scope.
 - c) We proposed that the costs of network adjustments required to make poles useable should be recovered across all users of the infrastructure without limitation, as we

considered that there is greater certainty around the total costs Openreach would be required to recover as a result of these adjustments. Accordingly, we did not include pole adjustments when calculating the financial limits.

d) We consulted on a range for the financial limit of £4,000 to £6,000 per kilometre.

Stakeholder responses

- 4.8 The majority of consultation responses supported our proposal for Openreach to recover the costs of network adjustments over all users of the infrastructure.²³⁹ For example, TalkTalk agreed that the current approach provides BT with an advantage and that our proposed approach would support competition and provide Openreach with stronger incentives to reduce the costs of network adjustments.²⁴⁰ Vodafone was of the view that telecoms providers should not pay for network adjustments as Openreach would be required at some point in the future to undertake the work irrespective of requests from PIA users.²⁴¹
- 4.9 Openreach opposed our proposal. It argued that recovering network adjustments over all users of the infrastructure subject to a financial limit would not create a level playing field as Openreach must bear these costs when deploying its own network, whereas PIA access seekers would not.²⁴² It said that instead, to the extent that it should be required to undertake network adjustments, Openreach should only bear the costs of adjustments where there are demonstrable material benefits to the Openreach infrastructure and its customers.²⁴³ It argued that our proposal would amount to artificial market entry assistance and could create significant levels of productive inefficiency due to the generation of incremental network build in areas where the underlying costs would typically be prohibitive.²⁴⁴ In addition, it argued our proposal would provide poor incentives for telecoms providers to minimise the costs of their requests.²⁴⁵ Openreach also argued that our proposals would transfer risk to Openreach and leave it exposed to high levels of uncontrollable costs driven by third parties²⁴⁶, which it questioned its ability to fund.²⁴⁷ In addition, it argued that it would have adverse impacts on its competitive position in relation to other end to end network providers.

²³⁹ Hyperoptic response to the April 2017 DPA Consultation, page 8; the PAG response to the April 2017 DPA Consultation, page 36; Flomatik response to the April 2017 DPA Consultation, paragraph 7.2.

²⁴⁰ TalkTalk response to the April 2017 DPA Consultation, paragraph 6.9.

²⁴¹ Vodafone response to the April 2017 DPA Consultation, paragraph 35.

²⁴² Openreach response to the April 2017 DPA Consultation, paragraph 113.

²⁴³ Openreach response to the April 2017 DPA Consultation, paragraph 100.

²⁴⁴ Openreach response to the April 2017 DPA Consultation, paragraphs 34 and 312.

²⁴⁵ Openreach response to the August 2017 DPA Consultation, paragraph 113.

²⁴⁶ Openreach response to the August 2017 DPA Consultation, paragraph 113.

²⁴⁷ Openreach response to the April 2017 DPA Consultation, paragraph 319.

- 4.10 Virgin Media also opposed our proposal, arguing that it would give telecoms providers using PIA an advantage over BT and end-to-end competitors that build their own infrastructure, and interfere with efficient investment signals.²⁴⁸
- 4.11 The majority of stakeholders supported our proposal to apply a financial limit to the cost recovery of network adjustments in order to create positive incentives on telecoms providers to reduce the costs of their requests and mitigate the risks of recovering costs over all users of the infrastructure.²⁴⁹ However, Flomatik noted that as well as creating positive incentives on telecoms providers, the financial limit could also reduce the incentive for Openreach to keep costs below the threshold.²⁵⁰
- 4.12 As to the level of the financial limit:
- a) Some stakeholders argued that the level of the financial limit should be higher than the range we consulted on, with figures up to £25,000 per km suggested.²⁵¹
 - b) Sky argued that if set at the average cost of network adjustments, the financial limit could result in network deployment only in those network areas where the build cost is below the limit and that it should avoid distorting incentives of where to use DPA.²⁵²
 - c) Openreach argued that the proposed financial limit range was too high compared to the average levels of actual costs it incurred, and gave no incentive for PIA customers to maintain cost controls on network adjustments and operate efficiently.²⁵³ Openreach proposed that it would be more proportionate to have a lower starting point for the financial limit, which could be corrected upwards over time if necessary.²⁵⁴ Openreach also proposed that there should be an overall annual budget for network adjustment capex across all PIA customers, to provide the notice required to secure the necessary capital funds and operational resources.²⁵⁵

²⁴⁸ Virgin Media response to the 2016 PIA Consultation, page 2. Virgin Media made no additional comments in response to the April 2017 DPA Consultation (see Virgin Media response to the April 2017 DPA Consultation, response to question 7.2).

²⁴⁹ Sky response to the April 2017 DPA Consultation, paragraph A5.19; Flomatik response to the April 2017 DPA Consultation, page 8; the PAG response to the April 2017 DPA Consultation, paragraph 87; TalkTalk response to the April 2017 DPA Consultation, paragraph 6.10 to 6.11; CityFibre response to the April 2017 DPA Consultation, paragraph 9.4.2; Hyperoptic response to the April 2017 DPA Consultation, page 12; Openreach response to the April 2017 DPA Consultation, paragraph 334. Flomatik response to the August 2017 DPA Consultation from, page 3; the PAG response to the August 2017 DPA Consultation, paragraph 86; CityFibre response to the August 2017 DPA Consultation, paragraph 5.1.3; Hyperoptic response to the August 2017 DPA Consultation, page 9; Openreach response to the August 2017 DPA Consultation, (paragraphs 101 to 102); BUUK response to the August DPA Consultation, page 1; Openreach response to the August 2017 DPA Consultation, paragraphs 101 to 102.

²⁵⁰ Flomatik response to the April 2017 DPA Consultation, page 8.

²⁵¹ CityFibre response to the August 2017 DPA Consultation, paragraphs 5.2.2 to 5.2.3; the PAG response to the August 2017 DPA Consultation, paragraph 86; TalkTalk response to the August 2017 DPA Consultation, paragraph 3.2. TalkTalk supported the financial limit in its response to the April 2017 DPA Consultation. See TalkTalk response to the April 2017 DPA Consultation, paragraph 6.10 to 11.

²⁵² Sky response to the April 2017 DPA Consultation, paragraph A5.20

²⁵³ Openreach response to the August 2017 DPA Consultation, paragraphs 84 to 86 and 103 to 105.

²⁵⁴ Openreach response to the August 2017 DPA Consultation, paragraphs 85, 147 and 155.

²⁵⁵ Openreach response to the August 2017 DPA Consultation, paragraphs 104 and 148.

- 4.13 Some stakeholders argued that no financial limit should apply, either to certain adjustments, or at all:
- a) While agreeing that there should be some limit to the costs that could be recovered for network adjustments to mitigate the risk that unnecessary network adjustments lead to unnecessarily high rental prices CityFibre suggested that clearly specified categories of costs should be recovered in full, arguing that this would reduce uncertainty around the cost of deployment.²⁵⁶
 - b) TalkTalk suggested that it would be prudent to not set a financial limit in this market review period, given the uncertainty about the level of incidents and costs associated with PIA due to its limited use so far.²⁵⁷
 - c) Vodafone disagreed with the concept of a financial limit. It considered that efficient network planning in relation to network adjustments could be agreed in the absence of a financial limit.²⁵⁸ Vodafone also believed that the financial limit could result in the first users of a duct being treated unfairly, as they would then bear some of the costs of increasing chambers and footway boxes, while subsequent builders would not be exposed to these costs.²⁵⁹

Our reasoning and decisions

Summary of our decision

- 4.14 We remain of the view that Openreach should recover network adjustment costs over all users of the infrastructure subject to a financial limit. We think this is necessary to promote competition by reducing barriers to investment in competing networks, including ensuring a level playing field with respect to the recovery of these costs.
- 4.15 We acknowledge that in some cases potential entrants may only find it profitable to build new networks in circumstances where they are not exposed to these costs, a form of entry which Openreach says is productively inefficient. However, we place weight on the benefits resulting from the greater competition that would arise in such cases. Nevertheless, given uncertainty about the extent of network adjustments required, we cannot rule out the risk that the cost of network adjustments is higher than we anticipate, with consequential implications for BT's cost recovery and greater potential for the costs of new entry to outweigh the gains. To mitigate this risk, we have therefore decided to impose a financial limit.
- 4.16 In what follows, we set out:
- a) why the current approach undermines the effectiveness of the remedy;

²⁵⁶ CityFibre response to the August 2017 DPA Consultation, paragraphs 9.4.1 and 5.2.8.

²⁵⁷ TalkTalk response to the August 2017 DPA Consultation, paragraph 3.2. TalkTalk supported the financial limit in its response to the April 2017 DPA Consultation. See TalkTalk response to the April 2017 DPA Consultation, paragraphs 6.10 to 11.

²⁵⁸ Vodafone response to the August 2017 DPA Consultation, page 10.

²⁵⁹ Vodafone response to the August 2017 DPA Consultation, pages 8, 10 and 11.

- b) our decision that Openreach should recover the cost across all users of the infrastructure;
- c) our decision that the obligation to recover the cost across all users of the infrastructure should be subject to a financial limit;
- d) our approach to setting the level of the financial limit and our decision on the level of the financial limit;
- e) how we have implemented these decisions through the pricing obligations we are imposing on BT in this WLA market review;
- f) our assessment of whether our decision might give rise to adverse effects;
- g) why our proposals are consistent with the six principles of cost recovery;

Openreach's current approach to charging competing telecoms providers the full cost of network adjustments undermines the effectiveness of the remedy

- 4.17 We are requiring Openreach to make certain adjustments to its network to overcome unusable sections of the physical infrastructure. Under the current PIA Reference Offer, Openreach offers to undertake a range of adjustments, and charges the full upfront cost for any work to the telecoms provider requesting it.²⁶⁰ We remain of the view that this approach undermines the effectiveness of the PIA remedy. We explain the reasons for this below.
- 4.18 In our view, network adjustments required by competing telecoms providers are similar in nature to adjustments made by Openreach to support BT's own use of the physical infrastructure; both involve making necessary changes to facilitate continued use of the physical infrastructure for the provision of a range of downstream services. However, Openreach's approach to recovering the costs of these adjustments differs depending on whether they support a competing telecoms provider's network deployment or BT's network deployment.
- 4.19 Openreach has always adjusted its network to support BT's own use of the physical infrastructure. The existing infrastructure as it stands today is the outcome of cumulative decisions to install the original infrastructure (for example, at the time the copper local access network was deployed) and make subsequent adjustments to enable it to continue to be used – whether for the maintenance of existing networks or to facilitate the deployment of new networks (for example, to accommodate the fibre supporting FTTC broadband services or leased lines).
- 4.20 To date, Openreach has to a large extent pooled the costs of infrastructure build and network adjustments required to accommodate the deployment and maintenance of BT's networks, and recovered them across all users of the physical infrastructure via

²⁶⁰ These include 'build and enabling' works (for example, new duct, chambers or poles, and replacement poles), as well as 'blockage clearance' and 'cable recovery'.

depreciation and return on capital employed on all products which use the physical infrastructure.²⁶¹ This reflects the view that the physical infrastructure is a shared asset used to provide a range of downstream services. Openreach has typically had freedom to choose what network adjustments to carry out to accommodate BT's use of the physical infrastructure, with the expectation that these costs will generally be recovered across a much wider set of products that use the infrastructure, including products in markets in which BT has SMP. For example:

- a) Where BT incurred duct costs associated with its FTTC deployments (for example, repairing or increasing the capacity of ducts or chambers), in most cases, these costs have not been attributed to FTTC products only, but instead have been treated in the same way as all other duct costs and recovered across all products which use the physical infrastructure.²⁶²
- b) Similarly, where physical infrastructure costs are incurred to support the deployment of leased lines and this relates to work on shared parts of the infrastructure, these costs are recovered across all products which use the physical infrastructure.²⁶³
- c) Openreach told us that the costs of undertaking build and enabling works in respect of its own network deployments are not booked to specific deployment types but instead to shared codes in the general ledger. Moreover, Openreach provided information which confirmed that these costs (all of which are capitalised) are typically attributed to a wide range of different services in different downstream markets including those in which BT has SMP Openreach.²⁶⁴

4.21 In contrast, Openreach has adopted a very different approach to recovering the costs of network adjustments required by competing telecoms providers using the physical infrastructure under the current PIA Reference Offer. Openreach effectively treats network adjustments required by other telecoms providers as incremental to the physical infrastructure as it stands at the time of the request, charging the telecoms provider which requests the adjustment the full upfront cost, rather than recovering the costs over all

²⁶¹ Annex 5 of the 2017 Regulatory Financial Reporting Consultation describes how duct and pole costs are currently recovered from downstream regulated services. Ofcom, 2017. *Regulatory Financial Reporting – Consultation on proposed directions to BT arising from the Wholesale Local Access and Wholesale Broadband Access market reviews*. https://www.ofcom.org.uk/data/assets/pdf_file/0022/108166/Regulatory-financial-reporting.pdf.

²⁶² A small proportion of duct costs, specifically those relating to duct built between fibre street cabinets, have not been recovered from regulated products. These accounted for around [\geq] % of total duct costs in 2016/17. Taken from AF20 (data file) supplied in confidence as part of the Regulatory Financial Statements. Note that the construction of new duct is unlikely to fall within the scope of the network access obligation, in which case Openreach will not be required to recover these costs over regulated products for other telecoms providers.

²⁶³ We note that BT levies Excess Construction Charges (ECCs) to recover the costs of customer-specific network construction work in association with a new connection. Only those elements that are unique to a single end-user site are chargeable as ECCs. Construction work that forms part of Openreach's common network (i.e. can serve more than one end-user site) falls outside the scope of ECCs. ECCs are also incurred for work relating to additional circuits required by the customer for resilience purposes. See 2016 BCMR Statement, Volume I, paragraph 10.103.

<https://www.ofcom.org.uk/consultations-and-statements/category-1/business-connectivity-market-review-2016>.

²⁶⁴ Openreach response dated 23 March 2017 to Question 49c of the WLA s.135 notice issued on 6 March 2017.

products using the infrastructure. Telecoms providers are therefore expected to recover the full cost of network adjustments from customers on the new network.^{265, 266}

- 4.22 As a result of this difference in approach to recovering the costs of network adjustments, BT faces lower risks associated with its network investments than competing telecoms providers. This is because BT's ability to recover the costs of network adjustments over all users of the infrastructure reduces the risk associated with an investment: even if the investment ultimately fails to generate the incremental revenues required to cover the incremental costs of the investment, the costs of network adjustments can still be recovered from products in markets in which BT has SMP.²⁶⁷ Competing telecoms providers do not benefit from the same ability to recover costs from services in which they have SMP when recovering costs of the network adjustments they require, and therefore face greater risk relative to BT.
- 4.23 We consider that this is likely to render the remedy ineffective as a basis for promoting the deployment of competing networks at scale. The business case for investing in full-fibre networks is inherently risky, with uncertainty around a range of factors such as the cost of deployment (including the extent and cost of required network adjustments), the time it will take to complete roll-out of the network, consumers' willingness to pay for fibre services, customer penetration, and the competitive response from existing market participants. In this context, the higher risk that competing telecoms providers face relative to BT could undermine incentives to invest in network deployment in the first place.
- 4.24 For example, the fact that BT recovers the costs of network adjustments across a range of SMP products means that, all else equal, BT can sustain lower prices than competing telecoms providers in the knowledge that recovery of these costs is guaranteed, and therefore can still make a return on its investment. Knowing that BT has this competitive advantage could deter potential entrants from going ahead with business cases that may be seen as marginal and risky.²⁶⁸

²⁶⁵ In addition, competing telecoms providers using PIA must also contribute to the costs of adjustments made to accommodate BT's use of the infrastructure, as these costs are part of the duct and pole asset costs which form the basis of PIA rental charges. BT makes no such contribution to the cost of adjustments required by competing telecoms providers.

²⁶⁶ We note that, under the current approach, Openreach also includes new or uplifted assets requested by PIA users in its asset base, resulting in over-recovery of these costs. Costs are recovered once from the telecoms provider requesting the adjustment through ancillary charges, and then start to be recovered again from all users of the physical infrastructure (including the telecoms provider requesting the adjustment) through PIA rental charges.

²⁶⁷ We recognise that the costs of some network adjustments may not be recovered from charge controlled products with immediate effect, due to these costs not being reflected in the cost base when the charge control was set. However, charge controls are typically set for a period of three years, after which the costs are expected to be reflected. This is a relatively short period compared to the accounting life of physical infrastructure over which costs are typically recovered. Moreover, an allowance for some network adjustments may already be included in the charge control (e.g. adjustments related to maintenance of the network).

²⁶⁸ We recognise that the costs of network adjustments might be considered "sunk costs" once the network is deployed, and therefore irrelevant to the pricing decisions of competitors. (Sunk costs are costs that, once incurred, are irreversibly spent i.e. they cannot be recovered. Therefore, prices can remain persistently below the level required to recover sunk costs without prompting market exit.) However, these costs are relevant at the point of entry. In deciding whether to enter, a rival telecoms provider will consider the likelihood of recovering the sunk costs that it will need to incur. BT's ability to sustain lower prices reduces the prospects of the rival telecoms provider recovering these costs such that it may

- 4.25 Moreover, competing telecoms providers face this disadvantage in a context where BT has substantial incumbency advantages as a result of sunk costs already incurred in deploying its existing network.²⁶⁹ Competing network providers will be competing with the services provided over BT's existing network. In addition, when BT deploys new networks or network upgrades, it is likely to be able to make use of existing network assets, and so require fewer network adjustments and face lower deployment costs as a result. For example, when deploying G.fast and FTTP, it may be able to make use of fibre already deployed to the cabinet for existing FTTC services.²⁷⁰
- 4.26 In response to the April 2017 DPA Consultation, Openreach claimed that the current approach to recovering the costs of network adjustments is equivalent: just as BT provides the upfront funding for network adjustments required to support BT's own network deployments, so a competing telecoms provider pays the full upfront costs of any network adjustments required for its network deployment.²⁷¹ We disagree. Our concern relates to how these upfront costs are ultimately recovered, not how they are initially funded. As with all investments, the key question is how the upfront costs (which must always be funded upfront) will subsequently be recovered, and it is the difference in how these upfront costs are ultimately recovered which undermines the level playing field and therefore the effectiveness of the remedy.²⁷²

Openreach should recover the costs of network adjustments over all users of the physical infrastructure

- 4.27 We have decided that Openreach should recover the costs of network adjustments over all users of the physical infrastructure. Below, we explain why we consider that this particular approach to cost recovery is necessary to promote network competition, and therefore realise the significant benefits resulting from other telecoms providers deploying ultrafast networks at scale. In summary, we consider that this approach will be most effective in removing the current advantage BT has and thereby achieving a more level playing field, and therefore ensure that investors have confidence that they can access BT's physical infrastructure on a comparable basis to BT. We also explain why this approach most

not be willing to incur them in the first place. Moreover, if a competing telecoms provider is unable to recover the sunk costs of an investment in one area, investors may be less likely to support further investment in competing networks in other areas.

²⁶⁹ See Section 4 of Volume 1, "Market power assessment".

²⁷⁰ BT may also benefit from being able to remove its existing network where capacity is scarce, to provide capacity for its new network. A competing telecoms provider does not have this option, and so may be required to install additional capacity themselves, in cases where BT is not required to do so as part of the network access obligation.

²⁷¹ Openreach response to the April 2017 DPA Consultation, paragraph 113. Openreach also argued that when it makes a decision to invest in FTTP, it will do so considering the full cash outflows required for the required network adjustments. Openreach response to the April 2017 DPA Consultation, paragraph 315.

²⁷² In response to the 2016 PIA Consultation, Openreach argued that its accounting system approach to allocate, and average, the costs of necessary works across services does not mean that BT considers this fact at the investment stage. In our view, the fact that BT could take into account the benefits of recovering network adjustment costs over all users of the infrastructure when faced with the threat of competition deters competitive network investment, irrespective of whether BT has actually taken this into account in its pricing and investment decisions to date. Openreach response to the 2016 PIA Consultation, paragraph 189.

effectively supports our aim to promote network competition by reducing the barriers to competitive network investment.

Recovering the costs of network adjustments over all users of the infrastructure will promote network competition

- 4.28 If telecoms providers do not have confidence that they can access BT's physical infrastructure on a comparable basis to BT, they are less likely to invest at scale. This is likely to worsen consumer outcomes as the benefits from other telecoms providers deploying competing networks are unlikely to be realised in full. Removing the advantage that BT has, and thereby ensuring a level playing field, is therefore necessary for the PIA remedy to be effective as a basis for competitive network deployment at scale. This is particularly important given the significant incumbency advantages which BT enjoys as a result of its historical investments in its existing network.
- 4.29 We have explained above why Openreach's current approach to recovering network adjustment costs is favourable to its own downstream business, giving it an advantage. In order to negate this advantage and achieve a more level playing field with respect to network adjustment costs, we have decided that Openreach should treat network adjustments required by other telecoms providers in the same way as it has always done when they have been required to support BT's investments. Specifically, Openreach should recover these costs over all products in markets in which BT has SMP and which use Openreach's physical infrastructure (including PIA).²⁷³
- 4.30 This will ensure that competing telecoms providers do not face greater risk than BT in respect of the recovery of network adjustment costs. We consider that this is necessary for the PIA remedy to be effective as a basis for promoting network competition at scale.
- 4.31 More generally, our approach reflects the fact that duct and pole infrastructure is a shared asset which benefits a range of downstream services. Openreach as well as other telecoms providers can be expected to benefit from adjustments to the physical infrastructure network overall. As physical infrastructure has a long asset life, past infrastructure investments will provide useable capacity for new fibre networks, and similarly infrastructure investments made now to support new fibre networks will provide useable capacity for future networks.

Alternative approaches to cost recovery will not be effective in addressing BT's advantage

- 4.32 An alternative to Openreach recovering network adjustment costs across all users might be that Openreach changes its current approach to recovering the costs of network adjustments required to support BT's network deployments, so that instead of recovering network adjustment costs across all of its services, it charges the costs to the relevant downstream service. We have evaluated whether such an approach would be effective in addressing the concern we have identified. We have considered two variants, based on

²⁷³ By way of shorthand, in what follows we refer to these products as 'SMP products that use the physical infrastructure'.

different approaches to how much of the network adjustment costs should be charged in this way:

- a) Telecoms providers and BT each bear the full costs of any adjustments associated with deploying their own networks. Under this approach, Openreach would not recover any of the costs of network adjustments from other products in markets in which it has SMP, including those required to accommodate BT's network deployment, and the full costs would be borne by the service requiring the adjustment.²⁷⁴
- b) Telecoms providers and BT each bear the genuinely incremental costs of any adjustments associated with deploying their own networks. Under this approach, Openreach would recover only the costs of adjustments which benefit other users of the infrastructure across all users of the infrastructure. However, the costs of adjustments which do not benefit other users of the infrastructure would be borne by the service that required the adjustment.²⁷⁵

4.33 We do not consider that either of these approaches would be effective for the following reasons:

- a) Given physical infrastructure is a shared asset, it may be difficult to identify the reason why a particular network adjustment is carried out. For example, Openreach would have an incentive to argue that network adjustments arising from upgrades intended to support its own downstream services are part of a general programme to maintain and improve its physical infrastructure, and so are not incremental to a new network deployment. This would be challenging to monitor.
- b) It is even more difficult to identify the costs of a network adjustment which are genuinely incremental to either BT's or a telecoms provider's network deployment. Whether or not costs are genuinely incremental depends on whether other products and users can be expected to benefit from a network adjustment. As physical infrastructure has a long asset life, this will depend not only on how the relevant infrastructure is used today, but also how it will be used in the future, which is inherently uncertain. Moreover, we do not consider that it would be appropriate to leave Openreach to decide this, as it could have the incentive and ability to identify

²⁷⁴ In its response to the 2016 PIA Consultation, Openreach suggested that if Ofcom is trying to ensure that Openreach's fibre broadband products and a competing ultrafast product built using PIA have equivalent infrastructure costs allocated via regulated accounts, it may be more appropriate to amend cost allocations to Openreach's own fibre broadband products. Openreach response to the 2016 PIA Consultation, paragraph 94.

²⁷⁵ In response to the April 2017 DPA Consultation, Openreach put forward a proposal where it would fund works where there is a clear and demonstrable benefit to the Openreach network and its customers. Openreach response to the April 2017 DPA Consultation, paragraph 43. As explained in Section 3, we are introducing a non-discrimination requirement that should be as close to EOI as possible. Under this requirement, when Openreach charges itself internal transfer charges, it must do so in a manner that is consistent with the charging principles that it applies to determine charges faced by telecoms providers using PIA, to the extent that a different approach cannot be justified. Therefore, if Openreach were to continue to charge competing telecoms providers for some network adjustments (i.e. those which do not benefit other users of the infrastructure), it would need to do the same for BT's network deployments and not recover these costs from other products in markets in which it has SMP.

costs in a way that puts competing telecoms providers at a disadvantage, and this would be challenging to monitor.

- 4.34 We do not consider that these alternative approaches would result in an effective PIA remedy. As explained above, if telecoms providers do not have confidence that they can access BT's physical infrastructure on a comparable basis to BT, they are less likely to invest at scale. Therefore, we consider that a requirement to recover the costs of all network adjustments over all users of the infrastructure is necessary to address the concern we have identified and therefore promote network competition.

Recovering the costs of network adjustments over all users of the infrastructure will reduce the cost and risk associated with competitive network investment, and incentivise competitive network build

- 4.35 More generally, BT has access to risk-reducing benefits from spreading the costs of network adjustments across all uses of the infrastructure. We consider that giving other telecoms providers access to the same risk-reducing benefits will promote network competition.
- 4.36 Based on the information available to us, we understand that the network adjustments BT is required to make as part of the network access obligation might cost up to around £94 per home passed²⁷⁶, which is material in the context of the total cost of deploying a rival network.²⁷⁷ Moreover, as the full extent of the network adjustments required will be uncertain when undertaking business planning, the level of expenditure required to make the physical infrastructure useable will be unpredictable. For example, some network adjustments are identifiable only following a field survey (for example, pole capacity constraints), whereas others cannot be identified until the network deployment stage (for example, collapsed duct).²⁷⁸ Faced with this uncertainty, exposing competing telecoms providers to these costs and the risks surrounding them could have a material impact in reducing their incentives to invest at scale.
- 4.37 Spreading these costs across all users of the physical infrastructure will result in a substantial reduction in the upfront costs of network deployment, and reduce the uncertainty competing telecoms providers face over the level of expenditure required to make the physical infrastructure useable. This will increase the attractiveness of entry compared to the current situation in which telecoms providers face these costs.

²⁷⁶ In Annex 26, we estimate the costs of those adjustments that are typically in scope of the access remedy using the PIA price list and available information on the incidence.

²⁷⁷ For example, Virgin Media cited a build cost of about £600 per premises (incl. connection) for Project Lightning (Enders Analysis, 2015. *Virgin Media Q4 2014 results: Growing and building.*); TalkTalk cited a build cost under £500 per premises in York (TalkTalk Group Preliminary Results, 10 May 2017); KCOM cited a build cost of £400 per premises (ISP Review, 2016. <http://www.ispreview.co.uk/index.php/2016/09/kcoms-ftp-broadband-roll-hull-uk-reaches-100000-premises.html> [accessed 28 July 2017]). Our own estimates suggest that, while PIA enables significant cost savings of deploying an end-to-end fibre network, the upfront cost of a large-scale network deployment is still significant. Excluding network adjustment costs, we estimate that PIA could reduce the average cost per home passed in some cases by up to 50%, from around £500 to £250 (excluding lead-ins).

²⁷⁸ Even where information is available at the desk planning stage (for example, capacity constraints), this information is not always complete, and the accuracy of this information cannot be guaranteed.

- 4.38 We also note that this is an additional advantage over the alternative approaches suggested by Openreach discussed above. As those approaches would involve passing some of the costs of network adjustments onto the telecoms provider, they would be less likely to promote competition not only because they would not address BT's advantage, but also because they would not reduce the cost and risk of deploying a rival network to the same extent as spreading costs over all users of the infrastructure.

Recovering the costs of network adjustments over all users of the infrastructure addresses the other problems which arise when telecoms providers are charged the full cost of network adjustments

- 4.39 Recovering network adjustment costs across all users of the infrastructure also addresses other issues with the current approach to cost recovery, which currently act as further barriers to rival network investment.
- 4.40 In particular, Openreach's ability to increase the costs of network adjustments for competing telecoms providers will be more limited when they are not charged the full cost. This is because when telecoms providers are charged the full cost of any adjustments (as is currently the case), there is a greater risk that Openreach increases the costs to competing telecoms providers, undermining the business case for entry (particularly given the scale of these costs). This is for two reasons:
- a) First, Openreach is the monopoly supplier of adjustments to its own network which other telecoms providers need to use. It will therefore have incentives to set higher charges to purchasers of such adjustments to increase its profits.²⁷⁹ This incentive would exist even if it set the same high prices to other telecoms providers as for its own downstream use, because in the case of charges for downstream use, Openreach would face lower profits downstream, but correspondingly higher profits upstream.²⁸⁰
 - b) Second, Openreach is also a vertically integrated provider of both the physical infrastructure and networks that use the infrastructure. It will therefore have the incentive to exploit any flexibility it has about how to adjust its network to increase the cost of network adjustments faced by competing telecoms providers.²⁸¹ For example, Openreach could select more costly network adjustments (or rule out lower cost

²⁷⁹ Charges for network adjustments are currently subject to a basis of charges condition which requires that they are reflective of the costs incurred. Although this limits Openreach's ability to set higher charges to increase its profits, it nevertheless retains a degree of flexibility. In principle this risk could be addressed through a price control. However, we note that in the BCMR 2016, we decided that attempting to price control Contractor ECCs (which are analogous to many network adjustment activities and form the basis of the prices Openreach sets for many network adjustments) carried an undue risk of regulatory failure given the significant risk of over- or under-recovery. BCMR 2016 Statement, Volume 2, paragraph 8.45. https://www.ofcom.org.uk/data/assets/pdf_file/0015/72312/bcmr-final-statement-volume-two.pdf

²⁸⁰ Under the non-discrimination obligation, when Openreach charges itself internal transfer charges, it must do so in a manner that is consistent with the charging principles that it applies to determine charges faced by telecoms providers using PIA, to the extent that a different approach cannot be justified. In principle, this might limit Openreach's incentive to set higher charges for network adjustments, given our expectation that Openreach's downstream businesses should cover its costs. In practice, Openreach will have a degree of flexibility as the assessment of whether a downstream business covers its costs will depend on a wide range of factors and would be looked at over a relatively long period of time.

²⁸¹ As explained in Section 2, Openreach has flexibility to choose the most efficient solution possible where it has more than one option available, and allows it to take account of its own future requirements. For example, there are several approaches to providing additional capacity on poles, each involving different levels of cost.

network adjustments) when dealing with competing telecoms providers using the infrastructure, but select the lowest cost network adjustments to facilitate BT's own use of the infrastructure. In doing so, it could increase costs to competing telecoms providers relative to BT's own downstream businesses, and deter, or at least disadvantage, potential network competitors.²⁸² Although the non-discrimination obligation should prevent Openreach from applying a different approach for external PIA users to the approach taken for its own network deployments, this is difficult to monitor as the most efficient network adjustment may sometimes be case specific.²⁸³ Moreover, the incentive to increase the cost of network adjustments may exist even if it were to apply the same approach to both competing telecoms providers and BT, if the payoff from dis-incentivising further entry by network competitors offsets the impact on BT.

4.41 Recovering network adjustment costs across all users of the infrastructure also means that telecoms providers will not be required to pay the full cost of infrastructure they do not fully utilise, nor will they be required to pay the full cost of network adjustments which Openreach would have needed to do anyway. Both are issues with the current approach where telecoms providers are charged the full cost of network adjustments, and both act as barriers to rival network investment. For example:

- a) Infrastructure has to be built in standard increments, meaning that telecoms providers will currently have to pay for infrastructure that they do not fully utilise. For example, where poles are damaged, telecoms providers currently have to pay for a replacement pole, irrespective of the number of dropwires they intend to attach. Similarly, where it is necessary for Openreach to provide additional chamber capacity, telecoms providers will have to pay for an enlarged chamber, even though they may require only a fraction of the additional space. Moreover, the telecoms provider that pays for these

²⁸² Openreach argued that constraints on contractor resources mean that it already has the incentive to follow the simplest and most cost-effective solution. We are not persuaded that constraints on contractor resources meaningfully limit Openreach's incentive or ability to choose more costly adjustments than necessary. In particular, Openreach can exploit its flexibility in the way described above without tying up its own contractor resources. In some cases, Openreach can select an approach which means that no network adjustment is necessary (for example, if Openreach says that removal of redundant cables is not feasible, the alternative will usually be the telecoms provider constructing its own duct rather than Openreach being required to do something else). In other cases, the competing telecoms provider may have agreed to carry out network adjustments on Openreach's behalf and so there is no impact on Openreach's resources. In any event, it may still be worthwhile for Openreach to increase the cost of network adjustments if the payoff from dis-incentivising further entry by network competitors offsets the impact of tying up contractor resources. We note that Openreach did not provide evidence that contractor resources are currently constrained, or will be constrained in future. Openreach response to the April 2017 DPA Consultation, paragraph 323.

²⁸³ For example, it is difficult to monitor whether Openreach is removing redundant cables or equipment to release existing capacity, given the asymmetry of information about whether there are redundant cables or equipment and/or whether it is feasible to remove them. We recognise that even where network adjustment costs are recovered across all users of the infrastructure, Openreach may still have some ability to push up the costs of network deployment for competing telecoms providers where the alternative is not in scope of the network access obligation. For example, where Openreach has flexibility to choose whether or not to remove redundant cables, this could result in a competing telecoms provider needing to install its own infrastructure (e.g. a new section of duct) to overcome the unusable section of the physical infrastructure at its own cost.

adjustments will not subsequently have ownership of them such that they can utilise the extra capacity to generate revenues in future.

- b) Openreach will need to undertake some network adjustments irrespective of requests from PIA users, to maintain its duct and pole network so it can support its own products (for example, replacing defective poles). Another telecoms provider may require a repair in advance of when Openreach schedules this work, and so in this case is only bringing forward costs which Openreach will incur anyway. In addition, some network adjustments may relate to maintenance that Openreach should already have undertaken.²⁸⁴ Nevertheless, competing telecoms providers are currently required to pay the full cost of these network adjustments. Openreach has little incentive to identify where it would need to undertake network adjustments anyway, as loading these costs onto network competitors could deter or disadvantage rival telecoms providers, and reduce Openreach's own costs.

A financial limit should apply to network adjustment costs to mitigate the risks associated with our approach

- 4.42 We consider that recovering the costs of network adjustments across all SMP products that use the physical infrastructure is necessary to promote network competition. We believe this will generate significant benefits to consumers in the longer term from competition and innovation (including innovation to increase efficiency and lower costs), choice, stronger incentives to price keenly to attract customers and higher quality of service. It is therefore highly likely that wide groups of consumers will benefit from network competition, not only those customers who take up the competing FTTP provider's service.
- 4.43 We recognise that under our approach, competing telecoms providers do not face the full incremental cost of deploying a network using Openreach's physical infrastructure. We acknowledge the possibility that this may result in competing network build occurring in circumstances where the build would not be profitable if access seekers had been charged for the network adjustments.²⁸⁵
- 4.44 However, we anticipate significant benefits to consumers where actual network competition emerges (see Section 5 of Volume 1, "Approach to remedies"). These dynamic benefits, which are not taken into account in the profit evaluations of potential entrants, mean even if our approach does result in some investment which would not have occurred if access seekers had been charged for the network adjustments, that does not mean our

²⁸⁴ Ofcom's Review of BT's Quality of Service found Openreach has not been using as much capital as is necessary to replace the assets that have reached the end of their useful life, in order to maintain its copper access network. See 2018 QoS Statement, Section 4.

²⁸⁵ In its response to the April 2017 DPA Consultation, Openreach said that such entry would be productively inefficient. We address these arguments in more detail later in this section.

approach is inappropriate.²⁸⁶ This is particularly so in the broader context where we are seeking to promote a major shift towards network competition over the next few years.

4.45 Although we can estimate some of the costs of network adjustments²⁸⁷, we recognise that the incidence of network adjustments is uncertain and variable, and may be higher than we expect, particularly in some areas. This is because:

- a) the quality and completeness of the information Openreach holds about the state of its infrastructure varies considerably;
- b) some network adjustments may be more difficult to anticipate as their necessity will depend on the facts of each specific request; and
- c) even if the cost of most network adjustments is expected to fall within a certain range for a particular type of work, there are likely to be extreme cases where the cost is significantly higher due to exceptional factors.

4.46 Given this uncertainty around the total costs Openreach will be required to recover across all SMP products that use the physical infrastructure, there is a risk that the cost of network adjustments is higher than we anticipate and therefore our proposal has a greater impact than we anticipate. In particular, the higher the costs of adjustments per home passed, the greater the risk of promoting investment where the benefits to consumers are not outweighed by the costs of deployment.

4.47 To mitigate this risk, we remain of the view that a financial limit should apply to network costs such that that Openreach recovers the costs of network adjustments up to a financial limit from SMP products that use the physical infrastructure (including PIA). Any costs incurred above the financial limit would then be recovered directly from the telecoms provider requesting the network adjustment, through ancillary charges.^{288, 289}

4.48 In deciding to impose a financial limit, we have also taken into account the following benefits:

- a) A financial limit reduces the uncertainty faced by Openreach as to the level of network adjustment costs it will have to fund upfront. In the April 2017 DPA Consultation, we recognised that there would be a degree of uncertainty around the total costs

²⁸⁶ We recognise that there are additional costs of promoting network competition – such as the duplication of fixed costs – that are not taken into account in the profit evaluations of potential entrants. In Section 2, we explain why we do not consider these costs to be so large as to render the form of PIA remedy we are imposing disproportionate.

²⁸⁷ In Annex 26, we estimate the costs of those adjustments that are typically in scope of the access remedy using the PIA price list and available information on the incidence.

²⁸⁸ The financial limit would apply to all telecoms providers using the physical infrastructure, including Openreach. Under the non-discrimination requirement, when Openreach charges itself internal transfer charges, it must do so in a manner that is consistent with the charging principles that it applies to determine charges faced by telecoms providers using PIA, to the extent that a different approach cannot be justified.

²⁸⁹ The application of ancillary charges for network adjustments would therefore be similar in methodology to how charges for any additional construction required for Ethernet Access Direct (EAD) services are currently applied, albeit the rationale differs. In that case, the first £2,800 of excess construction charges is exempt (and recovered from all EAD services through connection charges), but any excess construction charges above this amount are payable by the telecoms provider ordering the service. Ofcom, February 2014. *Excess Construction Charges for Openreach Ethernet Access Direct*, https://www.ofcom.org.uk/_data/assets/pdf_file/0023/80591/excess-construction-charges.pdf

Openreach will be required to recover across all SMP products that use the physical infrastructure, and that this would create a risk that our proposal would have a greater impact on Openreach than we anticipated. As we explain where we consider the adverse effects of our decision below, we are of the view that this uncertainty is unlikely to have a significant adverse impact on Openreach. Nevertheless, our decision to impose a financial limit will provide some certainty to Openreach over the maximum costs it will be required to fund.

- b) A financial limit also reduces the likelihood of disputes around the scope of the obligation, especially in cases where the incidence or unit cost of an adjustment is exceptional. With our financial limit, telecoms providers' incentives to request potentially unnecessary adjustments will be diminished as their exposure to paying for the adjustment comes in to play. This is more likely to apply in cases where the incidence or unit cost is exceptional and liable to prompt disputes.

4.49 In our April 2017 DPA Consultation and August 2017 DPA Consultation, we considered that the financial limit also has a role in providing an incentive for telecoms providers to request adjustments only where they represented the most efficient option available for overcoming an unusable section of the physical infrastructure. However, in light of our guidance setting out the extent to which Openreach is obliged to make network adjustments, we consider that the risk of inefficient network adjustments being made is small.

4.50 We explain below how we have set the level of the financial limit.

Approach to setting the financial limit

4.51 We are imposing a financial limit to mitigate the risks arising from uncertainty around the total cost of network adjustments that will be required. However, the fact that there is uncertainty around the total cost of network adjustments makes identifying the appropriate level of the financial limit an inherently challenging exercise.

4.52 We considered whether it would be better not to set a financial limit at this stage.²⁹⁰ However, in our view, the risks associated with not setting a limit outweigh the risks associated with setting a limit. If we do not set a limit, we cannot rule out the risk that network adjustment costs are significantly higher than we anticipate, with the potential adverse consequences described above. Conversely, we recognise that if we set a limit, there is a risk that we set it too low and therefore the costs of network adjustments above the financial limit continue to act as a barrier to competitive network investment.²⁹¹ At this stage in the development of the PIA remedy, we place more weight on the need for greater certainty as to the maximum impact of our cost recovery proposals, which a financial limit will provide. Moreover, we consider that our approach to setting the level of

²⁹⁰ As noted above, TalkTalk suggested that because of the significant uncertainty around network adjustment costs, it may be more prudent not to set a financial limit in this market review period.

²⁹¹ We consider the risks of setting the financial limit too high are the same risks as not setting a financial limit at all.

the financial limit, described below, reflects an appropriate balance between the risks associated with it being too low and the risks associated with it being too high.²⁹²

Consequently, notwithstanding the data limitations, we consider that it is appropriate for us to impose a financial limit. We also note that, if necessary, it would be possible to revisit the level of the financial limit, if new evidence suggested it had been set incorrectly.

The financial limit should be sufficient to cover adjustments that are typically in scope of the access remedy

- 4.53 In setting the level of the financial limit, our starting point is that it should be sufficient to cover those adjustments that are typically in scope of the access remedy. As in the August 2017 DPA Consultation, we have sought to identify those adjustments that we consider are clearly in scope, and estimate the likely incidence of each type of adjustment being required, as well as the average cost associated with making that adjustment. We then include an allowance to capture normal adjustment costs that are above the average, recognising there is a distribution of costs, and consider what, if any, allowance should be made for those adjustments which may or may not be in scope depending on case specifics.²⁹³
- 4.54 In its response to the August 2017 DPA Consultation, Openreach suggested that the financial limit should be set to reflect average costs to prevent inefficient network build.²⁹⁴ However, Openreach did not explain why it considers average network adjustment costs to be the relevant threshold for whether or not network build is inappropriate. In any event, for the reasons explained at paragraph 4.68 below, we consider that our approach of recognising that there is a distribution of costs does not result in a financial limit which is so high as to create a significant risk of encouraging entry which is inappropriate. We also consider that the uncertainty around how many adjustments will be required before network deployment means that setting a financial limit based on the average costs could deter entry even in areas where network adjustment costs would be below the average.²⁹⁵
- 4.55 Although we consider that a financial limit should be set at more than the average incidence, we recognise that there will be extreme areas which should be excluded. This is because the higher the cost of adjustments is per home passed, the greater the risk of promoting investment decisions where the costs outweigh the benefits, if access seekers do not face those costs. We are therefore of the view that the financial limit should be set at a level sufficient to cover the costs of typical or normal network adjustments, without

²⁹² As explained below, we consider that the level of the financial limit we are imposing will make a significant difference to the business case for network investment, while at the same time, resulting in costs that we consider are likely to be justified by the benefits of promoting network competition.

²⁹³ We have not considered the average costs of adjustments that we do not foresee typically being within scope of the access remedy.

²⁹⁴ Openreach response to the August 2017 DPA Consultation, paragraph 105.

²⁹⁵ In many cases the incidence of required network adjustments is not observable without a survey, and in the case of repairs, it is not known until the network deployment phase, typically after a PIA order has been placed. Therefore, access seekers are unable to select areas to deploy broadband services only where the incidence of in-scope network adjustments is at or below average. As a result, setting a financial limit based on the average costs could deter entry even in areas where network adjustment costs would be below the average.

necessarily covering exceptional cases where the cost of a specific network adjustment is significantly higher than the average cost for that particular type of work. Setting the financial limit to include the cost of all normal, in-scope adjustments, but to exclude exceptionally high cost adjustments, helps protect consumers from the risk that the costs of making the infrastructure ready for use outweigh the benefits that arise through network competition, while still enabling the benefits of network competition to arise in the majority of areas.²⁹⁶

We are setting a single financial limit on a per kilometre basis

- 4.56 As explained in Annex 26, we have estimated the costs of some network adjustments on a per kilometre basis, and other network adjustments on a per premises passed basis, reflecting the primary drivers of the incidence of different types of network adjustment. In our August 2017 DPA Consultation, we noted that although we had estimated some of these costs on a per premises passed basis, we recognised there may be challenges to using this as an appropriate practical measure for the purposes of implementing the financial limit. This was because objective information on the number of premises passed on any particular PIA order may be less readily available and more likely to lead to disputes and possible gaming. We therefore proposed to set a single financial limit which applies to the total number of kilometres of spine duct requested as part of a particular PIA order.
- 4.57 In its response to the August 2017 DPA Consultation, Openreach explained that since there may be scenarios where access seekers may only build an access network first, and then the final distribution elements (passing premises) later, some network adjustments would not be appropriate to include in a financial limit for an access-only network. Openreach therefore considered there is a strong case for having separate per-kilometre and per-premises-passed elements of the financial limit as the limits would be matched to the activities they are intended to control. At the same time, Openreach acknowledged that there would be practical challenges classifying access and final distribution network elements separately for the purposes of the financial limit.²⁹⁷
- 4.58 We are aware that since access seekers may have different approaches to planning and deploying networks, the distinction between the access and distribution elements of a network may be difficult to capture in a definition. Determining this distinction may instead require access seekers to provide Openreach with information about their network architecture and negotiate which elements may be considered as an access network and which might not. We therefore consider that it would not be practical to classify access and final distribution network elements separately for the purposes of the financial limit as Openreach has suggested. We acknowledge that choosing a per kilometre allowance means that the financial limit may not be available to support in-scope adjustments to

²⁹⁶ We recognise that as a result, telecoms providers may face some network adjustment costs in exceptionally high cost areas. However, we are of the view that the financial limit is likely to be sufficient to promote competition in the majority of areas.

²⁹⁷ Openreach response to the August 2017 DPA Consultation, paragraph 142.

lead-ins under every potential method of deployment.²⁹⁸ Based on our conversations with access seekers we do not believe that this issue poses a material risk to the effectiveness of the remedy.²⁹⁹ However, if this turns out to be a material issue, this is an area which may merit reconsideration in order to address any inconsistencies that arise.

Adjustments related to poles should be treated differently

- 4.59 In Section 2, we explain that in cases where an existing pole is capacity constrained, adjustments to provide additional capacity on poles are likely to be required. We also explain that where poles have capacity but cannot be used because they are defective, pole repairs and replacement are likely to be required.³⁰⁰ In the August 2017 Consultation, we proposed that the costs of making these types of adjustments for the purpose of attaching dropwires should be treated differently from other network adjustment and that such costs should instead be recovered from all users of the infrastructure without limitation.
- 4.60 TalkTalk supported our proposal to exclude the cost of network adjustments for poles from the financial limit.³⁰¹ However, Openreach considered that we did not carry out sufficient analysis before proposing that the cost of network adjustments for pole lead-ins should be without limitation and requested that we consider placing limits on the obligations related to overhead networks.³⁰²
- 4.61 We recognise that there are numerous details around pole-related network adjustments which Openreach and industry will need to work through as part of the development of the Reference Offer.³⁰³ However, we do not accept that the evidence concerning those details makes our broad approach to the recovery of the costs of these network adjustments inappropriate.
- 4.62 We remain of the view that network adjustment costs related to enabling poles to be used for dropwires should be recovered from all users of the infrastructure without limitation. This is because we view the balance of risks associated with setting a limit and not setting a limit in relation to these adjustments to be materially different from other types of network adjustment, for the reasons set out below.

²⁹⁸ For example, this could be in situations where an access seeker only seeks access to distribution chambers and lead-ins, opting to use their own access network elsewhere.

²⁹⁹ In discussions with Ofcom, not all access seekers indicated that they would like to make use of lead-ins. Others indicated that they were uncertain if they would make use of Openreach lead-ins or identified other issues such as pinch points in spine duct as issues of greater concern.

³⁰⁰ In both cases, this is subject to the adjustment being necessary (e.g. there are no alternatives available, such as using another pole nearby) and feasible.

³⁰¹ TalkTalk response to the August 2017 DPA Consultation, paragraph 3.4.

³⁰² Openreach response to the August 2017 DPA Consultation, paragraphs 158 to 159. Openreach remarked that there are various complexities surrounding pole capacity that we failed to consider and that our assessment was inaccurate. For example, it commented that it is inaccurate to assume the costs associated with replacing a dropwire in the context of PIA is similar to a simple dropwire replacement task, remarking that to do so understated the costs involved. Furthermore, it criticised our analysis for ignoring the relevance of other factors (such as the radial distribution of dropwire) when calculating the capacity of a pole. Openreach response to the August 2017 DPA Consultation, paragraph 167.

³⁰³ We discuss these in Section 6.

- 4.63 We understand that overhead lead-ins are generally the lowest cost means of connecting individual premises to a network, as using an aerial cable avoids the costly civil works required to deploy underground lead-ins.³⁰⁴ Moreover, the barriers to installing additional poles (for example, opposition from residents) make BT's existing pole infrastructure a particularly important enabler of commercially viable network competition. Therefore, we want to ensure that our approach to recovering the cost of network adjustments related to enabling poles to be used for dropwires does not in any way discourage the use of BT's existing poles.³⁰⁵ There is a risk that if we subject these network adjustments to a financial limit and set the limit too low, we will undermine the effectiveness of the remedy.³⁰⁶
- 4.64 Conversely, we think the risks associated with not applying a financial limit for these network adjustments are small. In particular, given the relative efficiency of using BT's poles for lead-ins compared to underground lead-ins, encouraging the use of BT's poles is less likely to result in entry where the benefits to consumers are not outweighed by the costs of deployment, particularly given other network adjustment costs are subject to a financial limit.³⁰⁷ Moreover, we estimate that the total cost of network adjustments related to enabling poles to be used for dropwires is around £17 per home passed, which is relatively modest compared to the cost of deploying a network. This also suggests that the uncertainty faced by Openreach as to the level of costs it will have to fund upfront is relatively limited.

The level of the financial limit and implications for cost recovery

- 4.65 Annex 26 sets out our calculation of the financial limit based on the approach described above. We have concluded that the financial limit should be set at £4,750 per kilometre.
- 4.66 Our objective in setting the financial limit is to mitigate the risks arising from uncertainty around the total cost of network adjustments that will be required. We have therefore

³⁰⁴ For underground lead-ins, civil works are at least required to get the fibre to edge of the property boundary. Civil works may also be required to get the fibre to the outside wall of the house.

³⁰⁵ Access seekers have explained to us that in order to be able to use the remedy to provide full-fibre to premises, there needs to be certainty that under all but the most unusual circumstances, an access seeker will be able to connect to the premises. If an access seeker is unsure whether connecting a premises will be possible, this will undermine the effectiveness of the remedy. This is because it is difficult to promote a new service on a 'subject to availability' basis when availability will change according to how many other premises have been connected previously (and the physical location of those premises). We note that Openreach would not face this issue because it can remove and replace its existing dropwire to provide full-fibre to an individual premises.

³⁰⁶ In the August 2017 DPA Consultation, we considered that there would be greater certainty around the total costs Openreach will be required to recover as a result of this adjustment, as the costs of removing or replacing dropwires per premises passed are readily identifiable and constrained. While we consider that these costs are readily identifiable and constrained, we recognise that Openreach would not be required to remove or replace existing copper dropwires under PIA. Therefore, our assessment of the costs of network adjustments related to poles is based on Openreach replacing poles to provide capacity. We recognise that there is a greater degree of uncertainty around the total cost of these adjustments. As a result, setting a financial limit on pole-related network adjustments carries particular risks, given Openreach has a range of options to relieve congestion on capacity constrained poles, with potentially quite different costs associated with each option. For example, setting a limit on the basis that Openreach chooses a low-cost option carries the risk that Openreach would then choose higher cost options to raise telecoms providers' network deployment costs (as they would pay the full cost of network adjustments above any financial limit).

³⁰⁷ For similar reasons, we think disputes around whether network adjustments related to enabling poles to be used for dropwires are required are less likely to arise compared to other network adjustments.

considered the likely implications of our proposed limit for the total network adjustment costs to be recovered from all users of the infrastructure.

- 4.67 This financial limit of £4,750 per kilometre equates to around £77 per premises passed on average. We also estimate the costs of relieving congestion on capacity constrained poles used to carry overhead lead-ins to be around £17 on average.³⁰⁸ Therefore, network adjustments which BT is required to make as part of the network access obligation might cost up to £94 per home passed, based on full usage of PIA.
- 4.68 In some cases this will represent expenditure on the physical infrastructure that Openreach would have incurred in due course in any event. We also expect the actual figure to be considerably lower, given that we expect the average cost of network adjustments to be lower and that new competitive networks are likely to be based on a hybrid design of end-to-end build and PIA-based build. However, assuming this figure is reached, the additional benefits to those consumers (above the costs of network deployment incurred by the telecoms provider) would need to be around £1.30 per month over a period of 10 years, or around 90 pence per month over 20 years, for this to lead to net benefits to consumers.³⁰⁹ In our view, this seems very plausible given the benefits of a better quality service (higher bandwidth, greater reliability), competition and greater choice that will arise in the longer term from rival fibre network deployment.
- 4.69 In terms of the total cost of network adjustments, we estimate that approximately [X] premises will be passed by other telecoms providers using a mixture of PIA-based and end-to-end build. This equates to around [X] premises passed using 100% PIA, by the end of this review period, [X] of these being passed in the final two years. The financial limit therefore implies a maximum cost of network adjustments associated with these network deployments by other telecoms providers of less than [X] over this review period.³¹⁰ If as many as 1 million premises were passed using 100% PIA, this would imply a maximum cost of network adjustments of less than £100m over this review period.
- 4.70 In this context, we consider that our proposed financial limit strikes an appropriate balance between an effective access obligation, enabling rival telecoms providers to use PIA to deploy their own fibre networks in competition with BT, while providing greater certainty on the total cost of network adjustments.

³⁰⁸ See Annex 26.

³⁰⁹ These calculations assume that the cost per home passed (£94) would be spread over 10 or 20 years using a discount rate of 10%. Over 10 years, this equates to around £15 per annum. Over 20 years, this equates to £11 per annum.

³¹⁰ This includes our estimate of the costs of relieving congestion on capacity constrained poles used to carry overhead lead-ins. To estimate the costs that we expect Openreach will actually need to recover over this review period, we use an estimate of the expected (i.e. average) network adjustment costs, rather than the level of the financial limit. We also include the costs of adjustments required by BT, which also need to be recovered across all users of the physical infrastructure. See Section 5.

Implementation of our decisions on the recovery of network adjustment costs

- 4.71 We have decided that Openreach should recover network adjustment costs over all SMP products that use the physical infrastructure, up to a financial limit. We are implementing this decision as follows:
- a) We are imposing a specific pricing obligation on ancillary services related to making network adjustments which would, among other things, require that BT must not charge for these services unless the charges exceed the financial limit. In such cases, BT must only charge (as a maximum) the amount in excess of the financial limit. We explain how we are doing this in Section 5.
 - b) We include an allowance for a proportion of the costs of making network adjustments (appropriately capitalised³¹¹) over all lines in the WLA charge control (i.e. allocated across WLR, MPF and GEA rentals).³¹² We describe how we calculate this allowance in Section 5.
 - c) We include an allowance for a proportion of the costs of making network adjustments (appropriately capitalised) in the calculation of maximum PIA rental charges. We describe how we calculate this allowance in Section 5.
- 4.72 Within the WLA charge control, we treat the allowance for network adjustment costs in the same way as other common physical infrastructure costs, by adding these costs to the pool of common costs which are recovered across fibre and copper lines. We describe our approach to common costs in Annex 11.³¹³
- 4.73 Although we are not setting a charge on services within the WFAEL market (i.e. WLR), these services have common assets with WLA services. We have therefore included WLR services in our charge control modelling in order to be able to determine appropriate common cost allocations. In its response to the April 2017 DPA Consultation, Openreach was concerned that it may not be able to recover network adjustment costs through this market. This was because of the restrictions on WLR prices as a result of the fair and reasonable pricing obligation on WLR lines (which prohibits a margin squeeze) and BT's commitments on retail prices.³¹⁴ We disagree with Openreach. We estimate that the costs that Openreach would need to recover are relatively small (around 2 pence per line per

³¹¹ We understand that various costs related to network adjustments to support Openreach's own network deployments (i.e. the costs of network planners related to the plan and design of build and enabling works, and the costs of undertaking build and enabling works) are typically capitalised. Openreach response to Question 49 of the WLA s.135 notice issued on 6 March 2017.

³¹² These costs are allocated to WLR, MPF, and GEA rentals using an equi-proportionate mark-up (EPMU). See the discussion on costs and revenues associated with duct and pole access in Annex 12.

³¹³ CityFibre argued that by recovering costs from both copper and fibre lines, our approach could result in artificially low fibre prices which will need to increase in the future. CityFibre response to the April 2017 Consultation, paragraph 9.3.4. We disagree. Our decision makes little difference to copper and fibre prices in this review period. In addition, stability of prices has been considered in setting the WLA charge control.

³¹⁴ Openreach response to the April 2017 DPA Consultation, paragraph 332.

month on average in the final year of the review period³¹⁵) and we do not see evidence that increasing WLR prices to reflect this additional cost would cause BT to breach its fair and reasonable pricing commitment.³¹⁶ Moreover, BT's retail pricing commitment only applies to voice only customers, which account for a small minority of WLR lines. With respect to other WLR lines, these costs would be factored into any assessment of compliance with fair and reasonable pricing obligation.

- 4.74 We recognise that Openreach recovers some physical infrastructure costs from leased lines services. We have not included a proportion of the costs of making network adjustments in the charge controls on services within the business connectivity market.³¹⁷ There are obvious practical difficulties involved in doing so, given the leased lines charge control was imposed prior to us reaching our decision. Nevertheless, we do not consider that doing so would have a material impact in this review period. This is because the allowance that we might include in the leased lines charge control is likely to be very small, relative to the total costs included in the leased lines charge control, for two reasons. First, the total network adjustment costs to be recovered in this review period is small (around £[3<]m).³¹⁸ Second, Openreach recovers a relatively small proportion of total physical infrastructure costs from business connectivity services.³¹⁹

Adverse effects

- 4.75 We have considered whether our approach to the recovery of network adjustment costs might give rise to adverse effects which are disproportionate compared to our objectives. We have considered the following potential adverse effects:
- a) The risk of promoting inefficient entry;
 - b) The risk of encouraging inefficient network adjustments;
 - c) The risk of distorting competition;
 - d) The financial impact on Openreach;
 - e) The impact on consumers.
- 4.76 As set out in our April 2017 DPA Consultation, in general, the impact of our approach to cost recovery is likely to be limited within this market review period given the natural

³¹⁵ As set out in paragraphs 4.89 and 4.144, the inclusion of network adjustments costs and productisation costs amount to less than 15 pence and 11 pence per line per year respectively. This is the sum of these costs divided by 12 months.

³¹⁶ Our review of the retail market for standalone landline telephone services found that the maximum price reduction that would be consistent with reducing prices to Ofcom's estimate of BT's costs meant a reduction in line rental of approximately £8 to 10 inc VAT per month, which is larger than the £7 price reduction offered by BT. See the 2017 RMSLTS Consultation, paragraph 8.30.

³¹⁷ Instead, we have assumed all costs will be recovered through the WLA charge control (and WLR rentals), and PIA rental charges.

³¹⁸ See Section 5.

³¹⁹ In 2017, Openreach allocated 18% of all duct costs to Business Connectivity Markets. See Openreach's Regulatory Financial Statements 2017, page 97.

<https://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2017/RRD2017Final.pdf>

constraints on build rates associated with mass broadband deployments.³²⁰ In the longer term, we recognise that the impact of our approach is likely to be more significant. However, any requests network adjustments will only arise where other telecoms providers are using PIA to deploy competing networks. Therefore, the scale of any impacts is contingent on the scale of network deployment, and so is directly linked to the scale of the benefits that result from imposing the PIA remedy. As a result, we consider that any adverse impacts are more likely to be justified by significant benefits to consumers in the longer term from greater network competition. In any event, we also have the flexibility to modify aspects of the PIA remedy in the future, in light of evidence and experience.

Risk of promoting inefficient entry

- 4.77 We recognise that our approach to cost recovery may result in competing network build occurring in circumstances where the build would not be profitable if access seekers had been charged for the network adjustments, as discussed above where we explain our rationale for a financial limit. In its response to the April 2017 DPA Consultation, Openreach said that such entry would be productively inefficient³²¹, and argued that we had not demonstrated that this is balanced by the future dynamic efficiency benefits from increased competition.³²² It also argued that that our approach to cost recovery amounts to artificial market entry assistance, with Openreach and its customers paying and assuming the risks, at least in part, for fibre network build of a third party.³²³ Similarly, Virgin Media has argued that our approach to network adjustment costs would promote inefficient entry, as telecoms providers would not bear the full costs of the infrastructure adjustments required to enable them to deploy their networks.³²⁴
- 4.78 These efficiency arguments appear to focus on whether entry would be profitable if access seekers had been charged for the network adjustments. However, this is not our primary objective. We are requiring BT to provide access to its physical infrastructure with the aim of promoting competition and investment in rival networks, in the context of BT's substantial incumbency advantages. Our approach to the recovery of network adjustment costs is necessary to support this objective. As explained in Section 5 of Volume 1, "Approach to Remedies", we anticipate significant benefits to consumers where actual

³²⁰ We estimate that approximately [3<] premises will be passed by other telecoms providers using a mixture of PIA-based and end-to-end build, equating to around [3<] premises passed using 100% PIA, by the end of this review period.

³²¹ Openreach argued that recovering the costs of network adjustments over all users of the infrastructure could create significant levels of productive inefficiency due to the generation of incremental network build in areas where the underlying costs would typically be prohibitive. Openreach did not elaborate on what it means by productive efficiency. Elsewhere in its response, Openreach referred to the need to ensure that investments only proceed when the forward looking long run costs are exceeded by projected revenues – which it refers to as economic axiom for efficient investment. In another part of its response, Openreach argued that the terms of access to Openreach's physical infrastructure should reflect the economic costs of providing such access, to ensure that telecoms providers make rational 'build/buy' decisions. We understand this to be a reference to the productive efficiency of telecoms operators' choices of whether to build a rival network or continue to rely on wholesale access to Openreach's network (specifically, VULA and LLU). Openreach response to the April 2017 DPA Consultation, paragraphs 62 and 42.

³²² Openreach response to the April 2017 DPA Consultation, paragraph 312.

³²³ Openreach response to the April 2017 DPA Consultation, paragraph 34.

³²⁴ Virgin Media response to the 2016 PIA Consultation, page 2.

network competition emerges.³²⁵ These dynamic benefits, which are not taken into account in the profit evaluations of potential entrants, mean that even if our approach does entail some degree of productive inefficiency (in the sense that Openreach uses the term), that does not mean our approach is inappropriate.

- 4.79 For example, our proposals could result in some cases where telecoms providers require network adjustments which cost Openreach a greater amount than the additional revenues the telecoms provider derives from the adjustment. In such cases, the telecoms provider only requires the adjustment because it does not have to pay the costs. However, it may be that the telecoms provider would not build a rival network at all if it had to pay the full costs of the adjustment. Accordingly the benefits arising from the greater network competition that results from network build would need to be taken into account. Entry that was inefficient in the sense used by Openreach could deliver substantial benefits to consumers in the long run.
- 4.80 With respect to the dynamic benefits, Openreach argued that we had not demonstrated that this productive inefficiency is balanced by the future dynamic efficiency benefits.³²⁶ We disagree. In Section 5 of Volume 1, “Approach to Remedies”, we have described the significant dynamic efficiency benefits that we expect to arise as a result of promoting greater network competition. We have not quantified these benefits since by their nature they cannot be readily or reliably quantified. However, as set out at paragraph 4.68 above, we have considered what level of benefits would be required to outweigh the likely costs of network adjustments, and consider this to be very plausible. We have also introduced a financial limit to provide a greater degree of certainty around the costs of network adjustments.
- 4.81 Turning to Openreach’s efficiency arguments in more detail, we do not agree with Openreach that facing telecoms providers with the full cost of network adjustments (as happens under the current approach to recovering the costs of network adjustments) necessarily ensures that entry decisions are efficient:³²⁷
- a) As explained in paragraph 4.41, this could deter efficient investment, as it does not reflect the fact that the network adjustments may benefit BT and other telecoms providers, now and in the future.³²⁸ As a result, there may be some cases where competitive network investment will not take place under the current approach, because the telecoms provider does not value the required network adjustment enough to pay the full cost, but all parties that benefit (now and in the future) would

³²⁵ In Section 5 of Volume 1, we describe the significant benefits to consumers in the long run from competition based on rivals investing in their own networks, including in comparison to competition based on regulated access to BT’s network and services.

³²⁶ Openreach response to the April 2017 DPA Consultation, paragraph 312.

³²⁷ Openreach argued that Ofcom should recognise the core principle of cost recovery that costs are attributed to the activity (and party) which causes them to be incurred and which directly benefits from them. It said that this will ensure that investment proceeds when the forward looking long run costs are exceeded by projected revenues – an economic axiom for efficient investment. Openreach response to the April 2017 DPA Consultation, paragraph 42.

³²⁸ For example, BT may need to make the adjustment at some point in the future for its own purposes.

be prepared to share the cost if faced with that decision. Therefore, sharing the cost of network adjustments can unlock competitive network investment that would not take place under the current approach. Under the current approach, the telecoms provider would be charged the full cost of any repairs required, which could deter investment if the telecoms provider does not value the repair sufficiently even if the total value of the adjustment across all beneficiaries exceeds the cost of the adjustment. Under our proposed approach, the telecoms provider would only make a contribution to the cost of the repair.³²⁹

- b) Although setting prices on the basis of genuinely incremental costs can generally provide efficient signals for investment (if dynamic gains arising from competition are ignored), we explain in paragraph 4.33 why it is likely difficult in practice to identify the genuine incremental costs of making the network ready for use, and why BT's incentives are poorly aligned with ensuring that the relevant costs are reliably estimated and efficiently incurred.

4.82 Lastly, Openreach suggested that by reducing the cost of network adjustments specific to FTTP, our approach would not be technology neutral and would artificially support FTTP networks.³³⁰ For example, in relation to new footway boxes for lead-ins in particular, Openreach argued that these could be extremely costly if required at scale and would not be required for an alternative technology such as G.fast, which would not require any additional infrastructure to be constructed.³³¹ However, we are not reducing the costs of network adjustments for any specific technology. The network adjustments Openreach is required to provide are those necessary for telecoms providers to access the infrastructure and compete with BT; they are not limited to a particular technology.³³² In any event, Openreach's suggestion that the need for new footway boxes would be overcome by the use of G.fast would require telecoms providers to use Openreach's active copper network in order to reach the premises. Therefore, the benefits of full-fibre network competition would not be realised.

Risk of encouraging inefficient network adjustments

4.83 Openreach argued that our proposed approach would provide poor incentives for telecoms providers to minimise the costs of their requests for adjustments once they had

³²⁹ Openreach argued that some network adjustments would be unlikely to add value to other users of the infrastructure as it considered further FTTP rollout unlikely, and observed that repairs to collapsed ducts may not be necessary to maintain its existing services. However, given the long asset lives of BT's physical infrastructure, many of these repairs would eventually be required in any case, and we consider that many network adjustments are likely to benefit current and/or future users of the infrastructure.

³³⁰ Openreach response to the April 2017 DPA Consultation, paragraph 273.

³³¹ Openreach response to the April 2017 DPA Consultation, paragraph 281.

³³² We recognise that to set the level of the financial limit, we have based our assumptions on the assumptions Openreach itself uses when planning a full-fibre network (see Annex 26). This modelling approach reflects our expectation that a competitor using PIA to deploy a competing network will most likely deploy a full-fibre network.

decided to deploy in a particular area using PIA, as they would not bear the costs associated with those requests.³³³

4.84 We recognise that there is a risk that telecoms providers may have a weaker incentive to minimise requests for network adjustments than under the current approach. However, we do not consider this to be a significant risk, as the ability for telecoms providers to obtain inefficient adjustments is limited by the network access obligation. This is due to the following reasons:

- a) As set out in Section 2, Openreach is only required to make network adjustments that are necessary, feasible, and where making the adjustment is more efficient than it would be for the telecoms provider to build its own network asset to circumvent the unusable section of Openreach's infrastructure.
- b) Openreach can also suggest alternative, more efficient routings, and has the flexibility to choose the most efficient solution to meet its obligation. This also enables Openreach to take into account its own future requirements, potentially avoiding the need for further adjustments at a later date.

4.85 In addition, under our approach, Openreach has a greater incentive to choose the most efficient way to undertake each network adjustment, compared to the current approach where all costs are passed on to the telecoms provider requesting the adjustment. We explain in paragraph 4.40 that Openreach has the incentive and ability to increase the costs of network adjustments when those costs are passed onto the telecoms provider.

4.86 Flomatik and [3<] commented that by imposing a financial limit on the network adjustment costs to recover across all users of the infrastructure, Openreach could have a reduced incentive to keep costs under the financial limit, to dissuade telecoms providers from requesting network adjustments.³³⁴ We acknowledge this is a risk of setting the financial limit. However, by setting it at a level which should include the cost of all adjustments other than those that are exceptionally high cost, and because there are some limitations on Openreach's ability to inflate costs (as described at footnote 279), we are of the view that this will not be an issue in the majority of circumstances. We also consider that the risk of setting the financial limit too low is outweighed by the risk of no financial limit. In addition, we have reserved direction making powers to adjust the financial limit if it proves necessary.

4.87 Openreach also argued that our approach to cost recovery is likely to incentivise telecoms providers to use BT's physical infrastructure over alternative infrastructure, and that this may result in unnecessary network adjustments. For example, Openreach argued that

³³³ For example, Openreach referred to a scenario in which a PIA customer requested a repair on a duct section when there was a suitable alternative route which could be used without network adjustment, and said that such a request would not be 'necessary' for the deployment of the PIA customer's network. Openreach response to the August 2017 DPA Consultation, paragraph 97.

³³⁴ Flomatik response to the April 2017 DPA Consultation, page 8. [3<]. Similarly, Vodafone argued that Openreach has little incentive to efficiently incur costs if they are wholly recovered through charges to the telecoms provider requesting them. Vodafone response to the April 2017 Consultation, paragraph 36.

telecoms providers are most likely to require Openreach to provide duct capacity relief or augment its existing infrastructure knowing that Openreach will fund the cost rather than use any spare capacity there may be in the ducts of another utility provider.³³⁵ We acknowledge that reducing the upfront cost of using Openreach's infrastructure increases its attractiveness compared to accessing alternative infrastructure under the ATI Regulations. However, as discussed in Section 2, we consider that access to alternative infrastructure under the ATI Regulations does not provide an effective basis for competitive network deployment at scale. Moreover, if Openreach is arguing that telecoms providers should break out of Openreach's infrastructure when they come across an unusable section of Openreach's infrastructure, and use alternative infrastructure where it is available, we note that there may be additional costs involved in doing so and therefore this may not actually be more efficient in practice.³³⁶

Risk of distorting competition

- 4.88 Openreach suggested that our proposal would distort its competitive position in relation to other network providers as it would need to increase prices to all users of the Openreach infrastructure, which would make its products comparatively less competitive.³³⁷ This would be in contrast to Virgin Media, which would be able to access Openreach's infrastructure, but there would be no reciprocal access obligation on Virgin Media to allow BT or other telecoms providers to use Virgin Media's infrastructure.³³⁸
- 4.89 We estimate the impact of recovering network adjustment costs (including those to support BT's own deployments) over all users of the infrastructure to be less than 15 pence ([£]) per line per year, which would amount to a very small increase in Openreach's prices.³³⁹ This small increase in prices is unlikely to affect Openreach's ability to compete, particularly given its SMP. However, the impact of our decision and objective of the PIA remedy is that other telecoms providers will be able to compete more effectively with Openreach.
- 4.90 With respect to Virgin Media's ability to use PIA, we have not placed a similar (reciprocal) obligation on Virgin Media as it does not have SMP. In any event, we note that Virgin Media is most likely to use PIA to expand its network footprint, and so will be using it in areas where it does not currently have any network presence.

³³⁵ Openreach response to the April 2017 DPA Consultation, paragraph 72.

³³⁶ For example, there would be costs to make connections between Openreach's infrastructure and the alternative infrastructure (such as break in/out costs and interconnecting ducts). Unless the alternative infrastructure was in close proximity to Openreach's, these costs could be significant.

³³⁷ Openreach response to the April 2017 DPA Consultation, paragraph 53.

³³⁸ Openreach response to the April 2017 DPA Consultation, paragraph 64.

³³⁹ This is the cost of network adjustments included in the charge control over the review period divided by 3 years and by 25 million lines. The same calculation for network adjustments required by other telecoms providers only gives a figure of [£] per line per year. These calculations do not allow for the offsetting PIA revenues. In addition, the actual impact on different rental products (e.g. MPF and GEA) will vary as a result of the way these costs are allocated. We set out the combined impact of including PIA related costs on MPF and GEA charges in Annex 12.

- 4.91 Openreach also argued that our approach would put it at a disadvantage to other telecoms providers, as only Openreach would need to consider the cash outflows associated with network adjustments at the start of a project. It argued that this disadvantage could disincentivise it from full-fibre network build.³⁴⁰ We addressed the first of these points above, where we described why our approach leads to a level playing field rather than an advantage to other telecoms providers. Moreover, by reducing the barriers to entry and promoting competition, we are creating incentives for BT to invest in full-fibre network build. This is because there is a higher chance of its customers switching to competing network providers if it does not respond to this greater competitive pressure. We consider it highly unlikely that BT will have lower incentives to invest as a result of our decision.
- 4.92 In addition, Openreach argued that our decision would harm its competitive position when bidding for BDUK contracts. It suggested that it would need to include the costs of network adjustments in its business case but competing bidders would not.³⁴¹ We disagree that our decision gives other telecoms providers an advantage over Openreach when bidding for BDUK contracts. Our decision on cost recovery applies in the same way to both BT and other telecoms providers. This means that in BDUK areas, the costs of in scope network adjustments could be recovered over all users of the infrastructure whether Openreach or a competing telecoms provider won the contract. Therefore, neither Openreach nor competing telecoms providers would need to include these as costs to be recovered through the BDUK contract.
- 4.93 Virgin Media also suggested that our approach to network adjustment costs would harm its competitive position as end-to-end competitors must recover the costs of “network adjustments” themselves.³⁴² In Section 2, we consider the impact of the PIA remedy more generally on end-to-end competitors which have already deployed networks, and consider that those same points apply here. In particular, we note that, an effective PIA remedy provides these telecoms providers with opportunities to expand their networks at lower cost (and more quickly), allowing them to compete in other areas where it would not be viable to deploy their own physical infrastructure.

Financial impact on Openreach

- 4.94 In response to our April 2017 Consultation, Openreach argued that our proposals would result in the transfer of significant risk to Openreach and its customers.³⁴³ It argued that the financial limit would not prevent it being exposed to high levels of uncontrollable costs³⁴⁴, and that strict budgetary and financial controls should be in place, including controls on its total financial exposure.³⁴⁵ It suggested that it could have difficulty funding these network adjustments as its free cash flow was constrained and likely to significantly reduce from

³⁴⁰ Openreach response to the April 2017 DPA Consultation, paragraph 316.

³⁴¹ Openreach response to the April 2017 DPA Consultation, paragraph 70.

³⁴² Virgin Media response to the 2016 PIA Consultation, page 2.

³⁴³ Openreach response to the April 2017 DPA Consultation, paragraph 151.

³⁴⁴ Openreach response to the August 2017 DPA Consultation, paragraph 113.

³⁴⁵ Openreach response to the August 2017 DPA Consultation, paragraph 17.

- current forecasts. It also questioned our view that there was little risk it would be unable to recover these costs, as they would be spread over a 40 year asset life.³⁴⁶
- 4.95 Although Openreach was of the view that the financial limit offered some mitigation of the risk to Openreach, it also noted that it would not limit the total amount of capital expenditure on network adjustments it would need to recover.³⁴⁷ It said that as a result it would be necessary to ensure strict budgetary, financial and contractual controls were in place.³⁴⁸
- 4.96 We recognise that our approach requires Openreach to recover additional costs of network adjustments over all products that use the physical infrastructure. However, we do not consider that our proposal will transfer significant risk to Openreach.
- 4.97 When regulating prices, we seek to ensure that Openreach has an opportunity to recover its efficiently incurred costs, including a return which reflects the associated risks of the investment. The fact that the physical infrastructure is a shared asset supporting a range of products lowers the risk associated with investment required to undertake network adjustments. We expect Openreach to have a customer base over which to recover these costs for the foreseeable future. Even if Openreach loses significant volumes of downstream customers to competing networks built using PIA, Openreach will still be able to recover these costs from charges for PIA users.
- 4.98 In this review period, we expect that the amount of cost transferred to Openreach will be relatively modest, given the natural constraints on build rates associated with mass broadband deployments. In addition, we have allowed for the recovery of these costs in the WLA charge control and through PIA rental charges, as described above.³⁴⁹ In future reviews, we will be able to consider the appropriate regulatory approach to network adjustment costs, and if Openreach's ability to recover those costs from other services changes we will take that into account at the time.
- 4.99 In response to Openreach's concern that it would need strict budgetary and financial controls, we consider that our overall approach provides Openreach with sufficient control. As set out in Section 2, the requirement on Openreach make network adjustments is limited to where this is necessary for its physical infrastructure network to be available to telecoms providers for the purpose of deploying their own network.
- 4.100 We recognise that there is a degree of uncertainty around the total costs Openreach will be required to recover across all SMP products that use the physical infrastructure, as the number of kilometres requested and the costs of adjustments in those areas are uncertain. This creates a risk of under-recovery of costs allowed for in the WLA charge control if these are higher than expected. However, there is also a risk of over-recovery, if fewer

³⁴⁶ Openreach response to the April 2017 DPA Consultation, paragraph 319.

³⁴⁷ Openreach response to the August 2017 DPA Consultation, paragraph 93.

³⁴⁸ Openreach response to the April 2017 DPA Consultation, paragraph 204.

³⁴⁹ In addition, although Openreach's ability to recover the proportion of costs allocated to PIA rental prices is less certain as take-up is uncertain, this proportion allocated to rental prices is small.

kilometres are requested or costs in those areas are lower than expected.³⁵⁰ Moreover, the risk of under- or over-recovery is inherent in Openreach's role in any project involving capital expenditure.

- 4.101 We do not expect this uncertainty to have a significant adverse impact on Openreach's financial position or its ability to invest in its own access infrastructure projects. As discussed in paragraph 4.69, we expect that even if as many as 1 million premises were passed using 100% PIA (which is well above forecasted volumes), Openreach would incur less than £100m to provide network adjustments required by other telecoms providers over the review period.³⁵¹ This is small relative to Openreach's total forecasted capital expenditure, which for 2018/19 is £ [X].³⁵² In addition, the financial limit, together with the natural constraints on build rates, provides some certainty over the maximum costs Openreach is likely to incur in undertaking network adjustments.

Impact on consumers

- 4.102 As discussed above at paragraph 4.80, Openreach argued that we had not demonstrated that the costs to consumers as a result of our proposals would be outweighed by the dynamic efficiency benefits. Similarly, it said that our approach did not support our objectives as it did not provide an overall limit to the infrastructure spend that Openreach and its customers could be required to bear.³⁵³ In addition it argued that it was not certain that the benefits would arise, as telecoms providers could cease to provide FTTP if, for example, they did not achieve the expected utilisation.³⁵⁴
- 4.103 We recognise that an increase in the costs Openreach recovers over products which use its physical infrastructure will increase the costs to be recovered by users other than of the competing telecoms provider. However, as explained above, we believe that in this case such effects are likely to be outweighed by the significant benefits to consumers in the longer term from innovation (including innovation to increase efficiency and lower costs), choice, stronger incentives to price keenly to attract customers and higher quality of service, which will benefit a wide group of consumers.
- 4.104 We consider there to be little risk of costs being incurred without these benefits to consumers arising, as the chances of the service being withdrawn after deployment are small. Telecoms providers are currently committed to paying for five years in rental charges. In addition, sunk costs account for a large part of the business case, meaning that even if revenues are lower than expected, it is likely that ongoing costs would be able to be recovered and the service would continue to be provided. Even if the particular telecoms

³⁵⁰ We note that the forecast in the charge control only applies to this three-year review period, which is a relatively small proportion of the accounting life of physical infrastructure. In future review periods, the actual costs (not yet depreciated) can be reflected in any charge control.

³⁵¹ Although we also include costs Openreach will incur to support BT's network deployments in the charge control, we do not consider these costs to be a source of uncertainty

³⁵² Openreach response to question 4 of the 43rd WLA s.135 notice issued on 4 January 2018.

³⁵³ Openreach response to the August 2017 Consultation, paragraph 103.

³⁵⁴ Openreach response to the April 2017 DPA Consultation, paragraph 337 and footnote 81.

provider had to exit, it is likely that another provider could take over and run the service at a profit.

- 4.105 In addition, we expect the impact on consumers from higher prices to be relatively modest in this review period, as costs incurred will be recovered over a relatively long time period. As discussed above, we estimate that the costs of network adjustments that Openreach will recover over the review period (including those required to support BT's network deployments) amount to an average of less than 15 pence per line per year.
- 4.106 Openreach also argued that our approach would mean that users of copper products and those in rural areas would end up contributing to the network adjustment costs required to enable telecoms providers to deploy ultrafast networks in densely populated areas.³⁵⁵
- 4.107 We recognise that while an effective PIA remedy could make downstream services potentially competitive in many geographic areas, leading to a reduction in prices, in other areas the prospects for rival investment are more limited. We also recognise that recovering costs over all users of the infrastructure would result in rural customers contributing to the costs of network adjustments carried out in urban areas. However, our approach simply reflects Openreach's existing approach of geographically averaging costs across the UK. We note that this has generally resulted in customers in urban areas contributing to the costs of the network in rural areas.
- 4.108 In future, given that network competition is unlikely to emerge in all areas, a greater degree of differentiation in our regulatory approach across the UK may emerge, with different remedies needed in different geographic areas. In such a case, we will consider the most appropriate approach to the recovery of costs taking into account market circumstances.
- 4.109 We have also considered CityFibre's argument that costs should be recovered over customers who subscribe to fibre lines only, as customers with copper-only connections are unlikely to benefit most of the improvements required to deliver PIA.³⁵⁶ We disagree with this view as a rival network will put competitive pressure on products at all levels. For example, new network providers will be able to compete for customers who subscribe to copper as well as fibre products. Customers that remain on copper are likely to benefit from the greater competitive intensity arising from the presence of an additional network competitor. In addition, as CityFibre notes, many current copper users are likely to migrate to fibre lines in the future. Moreover, this approach is most likely to create a level playing field between BT and other telecoms providers with respect to these costs, as we have described above.

Alignment with the six principles of cost recovery

³⁵⁵ Openreach response to the April 2017 DPA Consultation, paragraph 106. Openreach also made a similar argument in paragraphs 313 and 77.

³⁵⁶ CityFibre response to the August 2017 DPA Consultation, paragraph 4.3.1.

- 4.110 Referring to a number of its arguments described above, Openreach argued that our decision for it to recover the costs of network adjustments, subject to a financial limit, did not align with Ofcom’s six principles of cost recovery.³⁵⁷ Specifically, it argued that recovering costs over all users of the infrastructure would not align with:
- a) the principle of cost causation (that costs should be recovered from those whose actions cause the costs), as the network adjustments would be caused by the telecoms provider seeking access but not recovered directly from it;
 - b) the principle that costs should be recovered from the beneficiaries, as it argued there would be no link between the telecoms provider/end-users who would fund the adjustments and those in areas where networks would be deployed;
 - c) the principle of cost minimisation (that costs should be recovered in a way that creates incentives to minimise costs), as there would be no incentive for telecoms providers to minimise costs if not faced with those costs; and
 - d) the principle of effective competition (that the mechanism for cost recovery should not undermine or weaken the pressures for effective competition), as our decision would distort competition in various markets.
- 4.111 CityFibre also argued that our proposal did not align with Ofcom’s principles of cost recovery, primarily on the basis that competitive network deployment would be unlikely to benefit users of copper based services.³⁵⁸
- 4.112 Ofcom’s principles of cost recovery can be a helpful framework to consider whether our decisions have appropriately balanced the different objectives of promoting efficiency, promoting sustainable competition and acting in a way that benefits consumer. We disagree with Openreach that our decision does not align with them. We are of the view that our decision is consistent with Ofcom’s principles of cost recovery, and has appropriately balanced these objectives given the context of the PIA remedy.
- 4.113 Openreach has emphasised the principle of cost causation, i.e. that costs should be recovered from those whose actions cause the costs to be incurred. This can promote efficient decisions in some circumstances. However, in circumstances where there are substantial incumbency advantages and we are seeking to promote network competition and realise significant dynamic efficiency benefits, this is less relevant. We have therefore given more weight to the principle of effective competition in this case. The objective of the PIA remedy is to promote competition and our decision on cost recovery supports this objective by creating a level playing field and reducing the costs and risks associated with full-fibre deployment.
- 4.114 In addition, we consider that if Openreach charged PIA users for network adjustments, PIA users may be charged more than the actual or efficient incremental costs of making the network fit for purpose for them. This means that competitive network deployment could be deterred even if the incremental costs were lower than the expected revenues. Our

³⁵⁷ Openreach response to the April 2017 DPA Consultation, paragraph 77.

³⁵⁸ CityFibre response to the August 2017 DPA Consultation, paragraph 4.3.4.

approach does not achieve the outcome which the cost causation principle seeks to achieve, but neither does the current approach and it would be unlikely to be achieved through any alternative approach.

- 4.115 With regards to the principle that costs should be recovered from the beneficiaries, we acknowledge that costs will be recovered over a wider group of consumers than those who are likely to take up full-fibre services. However, our view is that competition will deliver benefits to a large proportion of consumers within the geographic area that rival network investment occurs, and will not be restricted to those who actually purchase services from the new network.
- 4.116 We also disagree that our decision conflicts with the principle of cost minimisation. As we discuss earlier in this section, where telecoms providers are charged upfront for network adjustments, Openreach would be likely to have the incentive and ability to inflate costs of network adjustments in order to increase the cost of competitive network deployment. Although we acknowledge that our decision does not fully mitigate this issue as telecoms providers will be charged for adjustments above the financial limit, we are of the view that this will not be an issue in the majority of circumstances due to the way we have set the financial limit and because there are some limitations on Openreach's ability to inflate costs, as we discuss in paragraph 4.86. Furthermore, although we acknowledge that telecoms providers do not have a strong incentive to minimise the costs of their requests, we do not agree that this creates a significant risk that these costs will be higher than necessary. Openreach is only required to make adjustments when doing so is more efficient than it would be for the telecoms provider to build its own network asset to circumvent the unusable section of Openreach's infrastructure, and has the flexibility to choose the most efficient solution to meet its obligation

Recovery of productisation costs

- 4.117 Openreach currently recovers costs incurred in setting up and managing the PIA product, and processing individual PIA orders, from PIA users. These costs, which we refer to as 'productisation' costs, are expected to be recovered in full from PIA users, through PIA rental charges³⁵⁹ or ancillary charges.
- 4.118 In this sub-section, we set out our decision on how productisation costs should be recovered in future. Productisation costs can be grouped into the following three categories:
- a) **setting up the PIA product:** the upfront costs incurred by Openreach in setting up the PIA product, for example, process design and systems development costs;
 - b) **managing the PIA product:** the ongoing administrative costs incurred by Openreach to support the PIA product; and
 - c) **per order processing costs:** costs incurred by Openreach when processing PIA orders.

³⁵⁹ Openreach included a contribution to these costs in the calculation of most PIA rental charges.

- 4.119 In our consideration of upfront costs, we include upfront costs which Openreach will need to incur in the future to further develop the PIA product, given these costs are similar in nature (for example, systems development costs).

Our proposals

- 4.120 In our April 2017 DPA consultation, we proposed that productisation costs should be recovered across all SMP products that use the physical infrastructure (including PIA).
- 4.121 We considered that differences between the productisation costs faced by telecoms providers using PIA and the equivalent costs faced by Openreach when it uses the physical infrastructure as an input to its own products, risked undermining the effectiveness of the PIA remedy as a basis on which to build competing networks at scale. We thought this was particularly likely given productisation costs currently make up a high proportion of overall rental charges.
- 4.122 We considered that recovering productisation costs from all products using the physical infrastructure – in the same way Openreach recovers the costs related to its own use of the physical infrastructure – would eliminate the differential between the costs faced by Openreach and other telecoms providers, and thereby ensure a level playing field.
- 4.123 We explained that this approach would also provide Openreach with a stronger incentive to provide PIA efficiently, whereas under the current approach Openreach has little incentive to minimise productisation costs. We also observed that in some cases Openreach itself will benefit from PIA related costs, and other telecoms providers will benefit from costs incurred in relation to Openreach's own use of the infrastructure, providing further support for our proposed approach.
- 4.124 Therefore, we proposed to remove the existing calculation of productisation costs from the calculation of the cap on PIA rental charges and replace it with an allowance for a proportion of productisation costs. We also proposed to include an allowance for a proportion of productisation costs over all lines in the WLA charge control (i.e. allocated across WLR and MPF Rentals). We set this out more detail in our August 2017 DPA Consultation, including the calculation of productisation costs and our proposal to cap at zero the ancillary charges that represented productisation costs.³⁶⁰

Stakeholder responses

- 4.125 Most stakeholders agreed that productisation costs should be recovered over all users of the infrastructure.³⁶¹ Openreach, Virgin Media and CityFibre argued against our proposal.

³⁶⁰ August 2017 DPA Consultation, paragraphs 4.61 and 4.62.

³⁶¹ Vodafone response to the April 2017 DPA Consultation, paragraph 37; Hyperoptic response to the April 2017 DPA Consultation, page 12; TalkTalk response to the April 2017 DPA Consultation, paragraph 6.12; Flomatik response to the April 2017 DPA Consultation, paragraph 7.3; [36].

- 4.126 Openreach questioned the need for costs to be recovered over all users of the infrastructure in order for the PIA remedy to be effective, as the level of PIA rental pricing had not been cited as a significant factor limiting telecoms providers' ability to invest in ultrafast networks, but rather was observed to be in line with international comparisons.³⁶²
- 4.127 Openreach also argued that we were departing from Ofcom's principles of cost recovery by recovering costs from users that do not cause those costs or benefit from them.³⁶³ For example, it argued that the extent to which other users will benefit from development of the system and planning tools for PIA is highly debateable, and that where a development cost is specific only to PIA it should be recovered only against PIA.³⁶⁴ It argued that in order to make efficient decisions, purchasers of PIA should bear these costs in their business cases.³⁶⁵ Openreach also argued that telecoms providers would not have the incentive to minimise costs, in particular those related to systems development, as they would not bear these costs. It argued that in contrast, it had the incentive to deliver efficient systems developments given the small scale of PIA, which it suggested could lead to under-recovery of these costs under the current approach.
- 4.128 CityFibre argued that costs should not be recovered from consumers of copper-based services, who would not cause these costs or benefit from these activities. It also argued that our decision would impose artificially low PIA charges which would distort the decision between network build using PIA and self-build.³⁶⁶
- 4.129 Virgin Media told us its views had not changed since its response to the 2016 Consultation, in which it argued that our proposals would risk introducing inefficiency.³⁶⁷

Our reasoning and decisions

- 4.130 We remain of the view that productisation costs should be recovered across all SMP products that use the physical infrastructure (including PIA). We explain below why we think this is necessary to ensure that the PIA remedy is effective as a basis for promoting the deployment of competing networks at scale.
- 4.131 As we described in our April 2017 DPA consultation, the productisation costs incurred to provide PIA are different to the comparable costs faced by BT when it uses the physical infrastructure as an input to its own other products. Currently, when BT uses its physical infrastructure, it does not consume PIA; it follows different processes and uses different systems, with different associated costs. In addition, in some cases there is no functional equivalent of a PIA process when BT uses its physical infrastructure for its own purposes.³⁶⁸

³⁶² Openreach response to the April 2017 DPA Consultation, paragraph 346.

³⁶³ Openreach response to the August 2017 DPA Consultation, paragraph 2.

³⁶⁴ Openreach response to the April 2017 DPA Consultation, paragraphs 340 and 342.

³⁶⁵ Openreach response to the August 2017 DPA Consultation, paragraph 6.

³⁶⁶ CityFibre response to the August 2017 DPA Consultation, paragraphs 4.4.1 to 4.4.5.

³⁶⁷ Virgin Media response to the April 2017 DPA Consultation, page 3.

³⁶⁸ For example, when another telecoms provider wants to use BT's physical infrastructure, it must submit deployment plans (drawn up by its own network planner) to Openreach for approval by an Openreach network planner. In contrast,

Although we are imposing a no undue discrimination SMP condition on BT that will require strict equivalence in respect of all processes and sub-products that contribute to the supply and consumption of duct access (unless differences can be justified), it is likely that differences in cost will remain, at least in the short-term.³⁶⁹

- 4.132 Differences between the costs faced by Openreach and the costs faced by other telecoms providers risk undermining the effectiveness of the remedy. This is because any disparity in the costs associated with using the infrastructure has the potential to undermine telecoms providers' confidence that they can access BT's physical infrastructure on a comparable basis to BT.³⁷⁰ This is particularly likely in this case given productisation costs currently make up a high proportion of overall rental charges (more than 50%³⁷¹ in some cases).³⁷²
- 4.133 Although Openreach argued that the aggregate level of PIA rental pricing has not been cited as a significant factor limiting telecoms providers' ability to invest in ultrafast networks, this observation does not remove the possibility that the current approach to the recovery of productisation costs may undermine the effectiveness of the remedy. In circumstances where Openreach is not consuming the PIA product, we think it is particularly important that telecoms providers have confidence that they can still access BT's physical infrastructure on a comparable basis to BT. Without this confidence, they are less likely to invest at scale, and so the benefits from other telecoms providers deploying competing networks are unlikely to be realised in full.³⁷³
- 4.134 We have therefore decided that Openreach should recover productisation costs incurred to provide PIA from all SMP products that use the physical infrastructure, as we understand it does for certain costs related to BT's own use of the physical infrastructure. Pooling these costs and then spreading them across all SMP products that use the physical infrastructure will eliminate the differential in the costs faced by BT and other telecoms providers, thereby providing telecoms providers with the confidence that they are competing on a level playing field. We consider that this is necessary for the PIA remedy to be effective as a basis for promoting competitive network deployment at scale.

when Openreach wants to use the physical infrastructure, the deployment plans drawn up by an Openreach network planner do not need to be separately approved in the same way.

³⁶⁹ As explained in Section 5, we envisage that in order to comply with the non-discrimination requirement, new platforms and/or processes used by BT would not differ to those used by other telecoms providers, other than in the most exceptional circumstances.

³⁷⁰ As well as the level of costs being different, BT also faces less risk than competing telecoms providers over the recovery of productisation costs. Specifically, where BT recovers costs relating to BT's network deployments over all products that use the physical infrastructure, including products in which it has SMP, it faces little risk over the recovery of these costs. We explain why in the discussion on cost recovery of network adjustments above.

³⁷¹ Based on the updated PIA pricing model provided to Ofcom on 12 August 2016.

³⁷² This is a result of the low PIA volumes assumed in the current methodology used to calculate PIA rental charges. This also points to potential volatility in rental charges in the short run due to changes in volumes if these costs continue to be recovered exclusively from PIA rental charges.

³⁷³ As a matter of fact, we note that some stakeholders have challenged the appropriateness of the current pricing level. Three argued the low take-up of PIA suggests that the current pricing may not be competitive and the PAG argued the current pricing is neither appropriate nor in line with other countries, once the structure of charges (in particular the activities which attract ancillary charges) is taken into account. Three response to the 2016 PIA Consultation, page 14. The PAG response to the 2016 PIA Consultation, paragraphs 6d and 85c.

- 4.135 In April, we considered that this approach would also provide Openreach with a stronger incentive to provide PIA efficiently, as it would also contribute to the recovery of productisation costs.³⁷⁴ Openreach disagreed with this, arguing that it already has the incentive to deliver efficient systems developments given the small scale of PIA.³⁷⁵ We acknowledge that our decision does not necessarily provide a strong incentive for Openreach to provide PIA efficiently given that it recovers these costs from products in which it has SMP. However, we disagree with Openreach that its current incentive to minimise costs, due to the risk it will not recover these costs, is a benefit of the current approach. Its incentive to minimise costs increases the risk that it will under-invest in PIA, as doing so would reduce the risk of under-recovery as well as harm the effectiveness of the PIA remedy.
- 4.136 We have decided to apply this approach to all three categories of productisation costs (setting up the PIA product, managing the PIA product and per order processing costs). Specifically, with respect to the costs of managing the PIA product – also known as sales, general and administration costs, or SG&A costs, Openreach said that it strongly disagreed with our position on the treatment of PIA SG&A costs³⁷⁶. However, this appears to be on the basis that it would be possible to include SG&A costs in the PIA cost stack on a consistent basis with the calculation of SG&A costs for other products. In our view, this would not address our concerns resulting from differences between the level of these costs and the equivalent costs faced by BT when it uses the physical infrastructure as an input to its own other products.
- 4.137 We disagree with Openreach that productisation costs should be recovered only from PIA users on the basis that users of other products will not benefit from them.³⁷⁷ In our April 2017 DPA consultation, we considered that Openreach would itself benefit from some PIA related costs and considered that this provided further support for our approach. However, this was not a key reason for our proposed approach.³⁷⁸ We are requiring Openreach to recover productisation costs over SMP products because we think it is necessary to promote competition, by ensuring that telecoms providers have confidence that they can access BT's physical infrastructure on a comparable basis to BT. We anticipate that this will lead to significant benefits to consumers, including those who do not take services from competing providers' networks.³⁷⁹

³⁷⁴ However, our approach reduces its incentive and ability to increase productisation costs if it can thereby increase PIA rental charges.

³⁷⁵ Openreach response to the August 2017 DPA Consultation, paragraph 183, third bullet point.

³⁷⁶ Openreach said that if SMP products pick up an allocation of system development costs, PIA should pick up an allocation of all system development costs that are allocated to SMP products. In addition, it suggested that a level playing field could be achieved in relation to SG&A costs by Openreach charging SG&A costs to PIA and other products on a consistent basis. Openreach response to the April 2017 DPA Consultation, paragraph 347.

³⁷⁷ Openreach response to the April 2017 DPA Consultation, paragraph 340.

³⁷⁸ In April we pointed to our understanding that Openreach network planners were making use of the PIA Digital Map Tool designed for PIA users, which Openreach disputed in its response.

³⁷⁹ For the same reason, we disagree with CityFibre's argument that costs should not be recovered from consumers of copper-based services.

4.138 In addition, Openreach argued that our approach would not create a level playing field. For example, it said that making systems development decisions for its own operational purposes, Openreach has to face the full up-front costs of the investment, whereas telecoms providers would not.³⁸⁰ However, as explained above, recovering these costs from telecoms providers would not create a level playing field as it would not address the disparity in the costs incurred when BT and other telecoms providers use the physical infrastructure.³⁸¹ In addition, as explained below, systems development costs are recovered across a range of products, including PIA.

Implementation of our decisions on the recovery of productisation costs

4.139 As explained above, we have decided that Openreach should recover productisation costs over all SMP products that use the physical infrastructure. We are implementing this decision as follows:

- a) We have removed the existing calculation of productisation costs in PIA rental charges and replaced this with an allowance for a proportion of the productisation costs. We describe how we calculate this allowance in Section 5.
- b) We have included an allowance for a proportion of productisation costs over all lines in the WLA charge control (i.e. allocated across WLR, MPF and GEA rentals).³⁸² We describe how we calculate this allowance in Section 5.
- c) We are imposing a specific pricing obligation on charges for productisation related ancillary activities which caps these charges at zero. We have set out which ancillary charges this applies to in Section 5.³⁸³

4.140 In principle, our approach is to pool productisation costs with comparable costs related to BT's own use of the physical infrastructure, and then spread them across all SMP products that use the physical infrastructure. However, we have not included any additional allowance in PIA rental charges for costs related to BT's own use of the physical infrastructure. In the August 2017 DPA Consultation, we explained that we asked Openreach to identify the costs associated with activities in relation to its own use of the physical infrastructure which are similar or equivalent to the productisation activities we

³⁸⁰ Openreach response to the August 2017 DPA Consultation, paragraph 183.

³⁸¹ It would also not address the differences in risk faced by BT and other telecoms providers with respect to the costs they incur, which we explain in footnote 370.

³⁸² Although we are not setting a charge on services within the wholesale fixed analogue exchange lines market (i.e. WLR) these services have common assets with WLA services. We have therefore included WLR services in our charge control modelling in order to be able to determine appropriate common cost allocations. We discuss this further in paragraph 4.73 above. We explain the approach to allocating these costs in the implementation of our decision on network adjustment costs.

³⁸³ In its response to the 2016 PIA Consultation, Openreach argued that we had dismissed the significant costs incurred to set up and operate the PIA service over the past five years, and that it has a reasonable and legitimate expectation that such costs can be recovered. With respect to costs already incurred, we have sought to include capital costs that are not yet fully depreciated, which Openreach has not yet had a fair opportunity to recover. We explain how we have done this in practice in Section 5.

capture above. Although Openreach could identify broad activities, it was unable to provide the granularity of financial information required to identify the associated costs (or how those costs are treated in the RFS) in the time available. However, we expect many of these costs to be reflected in the overheads already included in the calculation of rental charges.³⁸⁴ For example, Openreach told us that system related costs (e.g. the costs of PIPeR, BT's physical network inventory tool) are directly attributed to duct activity groups.³⁸⁵ Openreach has subsequently provided information that confirms that the costs of developing and maintaining the PIPeR system, and the cost of network planners related to the plan and design of build and enabling works, are generally attributed to various products that use the physical infrastructure, although in different proportions depending on the particular cost.³⁸⁶

- 4.141 We recognise that our approach may not result in Openreach recovering PIA productisation costs in exactly the same way as it recovers the equivalent costs incurred when BT uses the physical infrastructure. However, we consider that the approach we have adopted represents a sufficiently good approximation to provide telecoms providers with confidence that they can still access BT's physical infrastructure on a comparable basis to BT, in respect of these costs.
- 4.142 Specifically with respect to systems costs, in its response to our April 2017 Consultation, Openreach argued that it had already invested heavily in the underlying inventory systems developed for itself, but which also support the PIA product, which meant that an appropriate share of these its own systems development costs should also be allocated to PIA.³⁸⁷ As noted above, we understand that a proportion of Openreach's systems development costs are included within the overheads used to calculate PIA rental charges.

Adverse effects

- 4.143 We have considered whether our approach to the recovery of productisation costs might give rise to adverse effects which are disproportionate compared to our objectives.
- 4.144 In general, the costs we are requiring Openreach to recover over all users of the infrastructure are relatively small over this review period. As set out in Section 5, we estimate the total upfront costs of setting up the PIA remedy will be between £4m and £5.5m, and ongoing costs will be £[3<] per annum. This leads to total productisation costs of around £8m recovered over the review period, which amounts to an average of around 11 pence per line per year.³⁸⁸ Given the scale of these costs, our decision is unlikely to have

³⁸⁴ We also consider that the fact that Openreach cannot identify the specific costs, supports our view that its general approach is to spread these costs over a number of products rather than allocate them to the specific products they support. Moreover, Openreach has not challenged this view in its response to our consultations on DPA.

³⁸⁵ BT response to question 6 of the WLA s.135 notice issued on 27 January 2017.

³⁸⁶ Openreach response to question 49 of the WLA s.135 notice issued on 6 March 2017.

³⁸⁷ Openreach response to the April 2017 DPA Consultation, paragraph 342.

³⁸⁸ This is the total productisation costs included in the charge control over the review period divided by 3 years and by 25million lines. It does not allow for the offsetting PIA revenues. In addition, the actual impact on different rental products (e.g. MPF and GEA) will vary as a result of the way these costs are allocated. We set out the combined impact of including PIA related costs on MPF and GEA charges in Annex 12.

significant adverse effects in this review period. We respond to stakeholder concerns around the impact of our decision, in particular on telecoms providers' incentives and on Openreach's cost recovery, below.

Risk of promoting inefficient decisions

- 4.145 As described in the summary of stakeholder responses above, Openreach and Virgin Media suggested that our approach could encourage telecoms providers to make inefficient decisions, in terms of decisions on whether to invest and which services to request from Openreach, as they would not face the costs they incur when using the infrastructure.
- 4.146 We recognise that under our approach, competing telecoms providers do not face the full incremental productisation-related costs associated with their decision to deploy a network. We acknowledge that this could in principle result in competing network build occurring in circumstances where the build would not be profitable if access seekers had been charged the full incremental costs. However, we do not believe that this is a significant concern for the following reasons:
- a) Although we are of the view that charging telecoms providers these costs risks undermining the remedy (as any disparity in the costs associated with using the infrastructure has the potential to undermine telecoms providers' confidence that they can access BT's physical infrastructure on a comparable basis to BT), these costs are small relative to the total costs of competitive network build.
 - b) We also observe that a large proportion of productisation costs are not actually incremental to a particular telecoms provider's decision to invest, but are costs necessary to create an effective PIA remedy overall. Therefore, they are likely to benefit all telecoms providers using PIA, both now and in the future.^{389 390}
- 4.147 Moreover, we are requiring BT to provide access to its physical infrastructure with the aim of promoting competition and investment in rival networks, which we anticipate will lead to significant benefits to consumers. As we explained above, these dynamic benefits are not taken into account in the profit evaluations of potential entrants.
- 4.148 We disagree that our decision risks incentivising telecoms providers using PIA to request greater levels of system development than may be necessary. Openreach will retain a significant degree of control over systems development costs, as it decides how the systems development is undertaken in order to comply with the Reference Offer. However, as it no longer passes on these costs to competing telecoms providers, it does not have the incentive to increase these costs.
- 4.149 As to the incentives on telecoms providers to put in orders in a way which minimises the processing cost, we consider that telecoms providers will still have an incentive to put in

³⁸⁹ In addition, as these will be sunk costs at the time a telecoms provider chooses whether to deploy a network, it is not clear that it should face even a proportion of these costs if the objective is to promote efficient entry decisions (in the sense referred to by Openreach).

³⁹⁰ We also note that even where productisation costs are incremental to a particular telecoms provider's decision to invest, recovering these through PIA rental charges means that they also do not face the actual incremental costs; rather they face a proportion of the total forecast productisation costs.

orders in an efficient way under our approach, as they incur their own administrative costs associated with submitting orders. In addition, putting in orders in an inefficient way would be likely to delay network deployments.

Impact on Openreach

- 4.150 We recognise that our approach requires Openreach to recover additional costs. However, we do not consider that this will have a significant impact on Openreach. We have included an allowance for the recovery of these costs in the WLA charge control and PIA rental prices.
- 4.151 In the 2016 Consultation, we explained that recovering the costs of setting up the PIA remedy from PIA users through rental charges would be highly likely to lead to over-recovery or under-recovery of those costs, given the uncertainty around PIA take-up.³⁹¹ Although Openreach acknowledged that our approach creates less risk of under-recovery than the current approach,³⁹² it argued that the current PIA basis of charges obligation and pricing methodology is able to encompass the uncertainties associated with PIA take-up.³⁹³ Nevertheless, we consider that our decision significantly reduces the likely under- or over-recovery of costs of setting up the PIA remedy, in comparison to the current approach. As these are currently recovered through PIA rental charges, recovery is highly dependent on the accuracy of forecasted take-up, which is uncertain. Recovering costs over all users of the infrastructure removes this uncertainty.
- 4.152 In relation to productisation related ancillary charges, Openreach argued that removing items from the price list in advance of the new Reference Offer was premature, as the costs associated with these activities are currently uncertain. We recognise that there is greater uncertainty over the total costs Openreach will incur in relation to those costs that are dependent on PIA take-up. Therefore there is a risk of under-recovery. Equally there is a risk of over-recovery. We have no evidence to suggest these risks are asymmetric. In any event, we explain above why it is necessary to recover these costs over all users of the infrastructure. Moreover, these costs are likely to be small (in Section 5 we estimate that total per order processing costs will be £[X] per annum on average).

Legal tests

- 4.153 We explain why we consider that our decisions in relation to cost recovery satisfy the relevant legal tests in Section 5.

Consistency with European Commission Recommendations and BEREC Common Positions and Guidance

- 4.154 As set out in Section 5, we have taken due account of all applicable recommendations issued by the European Commission under Article 19(1) of the Framework Directive and

³⁹¹ 2016 DPA Consultation, paragraph 5.21.

³⁹² Openreach response to the April 2017 DPA Consultation, paragraph 344.

³⁹³ Openreach response to the April 2017 DPA Consultation, paragraph 346.

the utmost account of any relevant opinion, recommendation, guidelines, advice or regulatory practice adopted by the Body of European Regulators for Electronic Communications (BEREC pursuant to Article 3(3) of Regulation (EC) No 1211/2009).

5. Price regulation of PIA

- 5.1 In this section we set out our decisions on pricing remedies with respect to PIA. We first explain why price regulation on PIA is required. We then set out our approach to the two broad categories of charges for PIA:
- a) **rental charges** which relate to infrastructure sharing, including duct, pole, joint box and manhole sharing; and
 - b) **ancillary charges** which relate to supplementary services or activities which Openreach carries out on behalf of a telecoms provider using PIA.
- 5.2 With respect to PIA rental charges, we are imposing a cap on each of the existing PIA rental products. The maximum charges are set out in the table below, alongside Openreach's current charges.

Table 5.1: Current PIA rental charges and maximum PIA rental charges (per year)

	Current charge	Maximum charge
Facility in Spine duct per metre - single bore	£0.60	£0.28 (-53%)
Facility in Spine duct per metre - 2 bores	£0.43	£0.18 (-58%)
Facility in Spine duct per metre - 3+ bores	£0.37	£0.14 (-62%)
Facility in Lead-in duct per	£0.84	£0.56 (-33%)
Facility on pole for Multi-end-user attachment	£15.48	£11.19 (-28%)
Facility on pole for Single-end-user attachment	£8.85	£4.79 (-46%)
Pole top equipment	£3.72	£3.47 (-7%)
Cable up a pole (per cable)	£2.39	£2.26 (-5%)
Facility hosting (per manhole entry)	£11.18	£8.49 (-24%)
Facility hosting (per joint box entry)	£5.11	£2.04 (-60%)
Customer Apparatus In-line Splice hosting and distribution joints (per manhole splice)	£40.06	£29.75 (-26%)
Customer Apparatus In-line Splice hosting and distribution joints (per joint box splice)	£31.42	£18.44 (-41%)
Customer Apparatus Cable Coil Hosting - small (per manhole)	£25.90	£14.88 (-43%)

	Current charge	Maximum charge
Customer Apparatus Cable Coil Hosting - medium (per manhole)	£40.06	£29.75 (-26%)
Customer Apparatus Cable Coil Hosting - large (per manhole)	£54.23	£44.63 (-18%)
Customer Apparatus Cable Coil Hosting - small (per joint box)	£18.46	£9.22 (-50%)
Customer Apparatus Cable Coil Hosting - medium (per joint box)	£31.42	£18.44 (-41%)
Customer Apparatus Cable Coil Hosting - large (per joint box)	£44.38	£27.66 (-38%)

Note: Charges shown are per annum (excluding VAT). Rental charges for 'lead-in link' rental products are not shown, as these are equal to the corresponding duct rates. The maximum charges for these products are therefore set equal to the maximum charges for the corresponding duct rates. The maximum charges shown above are applicable from 1 May 2018. In each subsequent year, the maximum charges will be updated for inflation, measured using the Consumer Prices Index (CPI).

5.3 With respect to ancillary charges:

- a) We are capping ancillary charges related to network adjustments undertaken to provide capacity on poles or to make poles useable for dropwires at zero. This reflects our decision that the costs of these network adjustments should be recovered from all users of the infrastructure without limitation.
- b) For ancillary charges related to all other network adjustments, we are permitting Openreach to charge only the amount that exceeds the financial limit. This reflects our decision that the costs of network adjustments should be recovered from all users of the infrastructure up to the financial limit. We are imposing a basis of charges condition which requires that charges for these network adjustments are cost oriented, including when being calculated for the purposes of applying the financial limit.
- c) We are capping the charges for ancillary activities that represent productisation activities at zero, reflecting our decision that the costs of these activities should be recovered across all users of the physical infrastructure. We have included an allowance for these costs in the WLA charge control and in our calculation of the caps on PIA rental charges.

5.4 With respect to all other charges, including any new PIA products introduced in this review period, we are imposing a basis of charges condition which requires that charges are cost oriented.

Need for price regulation on PIA

Our proposals

- 5.5 In the April 2017 DPA Consultation, we provisionally concluded that given BT has SMP in the WLA market there is a risk of adverse effects arising from a price distortion in that BT might fix or maintain its prices at an excessively high level. This could undermine the case for investment by competing telecoms providers, and so undermine the effectiveness of the obligation to provide PIA. It could also result in higher retail prices. All of these effects are ultimately against the interests of consumers.
- 5.6 We provisionally concluded that some form of price regulation is required to support the obligation to provide PIA for two reasons. Firstly, in order to guard against the risk that BT engages in such behaviour. Secondly, we believe certainty as to the level of charges for PIA is necessary to fully support investors' ability to build a viable business case for network deployment using PIA.

Stakeholder responses

- 5.7 No stakeholder disputed the need for price regulation, although they offered different views on how this should be implemented.

Our reasoning and decisions

Some form of price regulation is required to address the risk of excessive pricing by BT

- 5.8 Given our conclusion that BT has SMP in the WLA market, it is likely that BT would have the incentive and ability to set excessively high prices for PIA. In particular:
- There is a risk that BT sets excessive prices to maximise the profit it earns from providing access to its physical infrastructure.
 - There is a risk that BT sets excessively high prices to increase the overall cost of building a network using PIA, with the intention of preventing or limiting the emergence of further network competition by undermining the investment case for network deployment based on PIA.³⁹⁴
- 5.9 The adverse price effects could undermine the effectiveness of the obligation to provide PIA, and also result in higher retail prices, all of which is ultimately against the interests of consumers.
- 5.10 Consequently, it appears to us from the market analysis we have carried out that there is a relevant risk of adverse effects arising from BT fixing or maintaining its prices at an

³⁹⁴ Even if telecoms providers ultimately deploy competing networks using PIA, there is a risk that BT would set excessively high prices to favour Openreach's downstream business (which does not consume PIA as an input), putting rivals that have deployed a competing network using PIA at a competitive disadvantage. In addition, knowing that BT has the ability and incentive to increase prices in the future (to favour its own downstream business or maximise profit) could also deter competitive network investment from happening in the first place.

excessively high level, so as to have adverse consequences for end-users of public electronic communications services.

- 5.11 Price regulation guards against the risk that BT engages in such behaviour. Therefore, our view is that some form of price regulation is required to support the obligation to provide PIA.

Certainty as to the level of PIA charges is important

- 5.12 As explained in Section 2, we are imposing the PIA remedy to address BT's SMP by promoting the deployment of competing networks at scale. Certainty and predictability over the level of charges for PIA is necessary to fully support investors' ability to build a viable business case for network deployment using PIA. Indeed, in their consultation responses, many stakeholders highlighted the importance of certainty and predictability about future PIA pricing for making an investment decision.³⁹⁵ With respect to PIA rental charges, although the charges in a given year will be relatively modest compared to the significant upfront costs of deploying a network using PIA, network investment decisions are typically evaluated over a long time horizon, over which time the total PIA rental charges could represent a material proportion of total costs over the lifetime of the investment.³⁹⁶
- 5.13 We recognise that we typically set price regulation only for the duration of the review period, whereas investors require certainty over a longer period. However, we do not agree with Openreach's suggestion that pricing certainty is restricted to a three-year horizon.³⁹⁷ We cannot prejudge what actions we will take in the future, as any pricing decisions in future reviews will be made in light of the circumstances and legal framework applicable at that time. However, our decision seeks to implement our longer-term strategy to promote greater network competition, and therefore we expect future reviews to consider how any pricing decisions can support this goal. More generally, we recognise the importance of regulatory consistency and predictability over time. We think that investors will place considerable weight on us providing proper constraints on Openreach's ability to set inappropriate charges in the long run and in the short run.
- 5.14 In what follows we consider the approach to rental charges first, then ancillary charges.

³⁹⁵ The Advisory Committee for Scotland response to the 2016 PIA Consultation, page 3; CityFibre response to the 2016 PIA Consultation, pages 3 and 13; GTC response to the 2016 PIA Consultation, page 13; Hyperoptic response to the 2016 PIA Consultation, page 17; Liquid Telecom response to the 2016 PIA Consultation, page 7; the PAG response to the 2016 PIA Consultation, paragraph 81.a; and Vodafone response to the 2016 PIA Consultation, paragraph 109.

³⁹⁶ Stakeholders typically refer to a time horizon of at least 10 years and sometimes well in excess of that period. See Liquid Telecom response to the 2016 PIA Consultation, pages 7 to 8; Openreach response to the 2016 PIA Consultation, paragraph 302; TalkTalk response to the 2016 PIA Consultation, paragraph 5.8; and [3] response to the 2016 PIA Consultation, paragraphs 25 and 38.

³⁹⁷ Openreach response to the 2016 PIA Consultation, paragraphs 273 and 277.

PIA rental charges

Our proposals

- 5.15 In the April 2017 DPA Consultation, we provisionally concluded that the current basis of charges condition on PIA rental charges does not provide potential investors with sufficient certainty as to the level of rental charges they would face. This was because Openreach has freedom to revise the methodology it currently adopts to calculate rental charges, with potentially significant impacts on those charges.
- 5.16 We provisionally concluded that our duties are best met by addressing the excessive pricing risk we have identified through a cap on rental charges, as this will provide investors with greater certainty over the level of these charges and thus facilitate building a credible business case for deploying a network using PIA.
- 5.17 We explained that it is not currently practicable to apply a price cap based on BT's fully allocated costs (as we do in some other charge controls) as the necessary cost data is not reported to the required level of granularity in BT's accounting systems.³⁹⁸ We considered a number of approaches to providing more certainty about PIA pricing, and provisionally concluded that imposing a cap on rental charges based on the current methodology would be an appropriate approach in this review period. In particular, this would be an effective means of providing certainty to investors over the market review period and would result in PIA rental charges being at a level which should avoid undermining network investment.
- 5.18 In the August 2017 DPA Consultation, we set out how we proposed to use the current methodology to calculate the maximum charges that should apply to PIA rental products for this review period. As a general approach, we proposed not to depart from the current methodology unless it is clearly inappropriate, as this provides certainty for a period of time.
- 5.19 As regards the form of the price cap, we proposed that:
- maximum charges will be calculated for each PIA rental product;
 - the maximum charges will apply from the start of the review period; and
 - the maximum charges will be updated for inflation each year.
- 5.20 We then set out our proposed approach to calculating the asset costs component, network adjustment costs component and productisation costs component of the total costs to be recovered per unit of each PIA rental product. We provided details of the calculation steps for each of those components, the inputs used and the assumptions made.

³⁹⁸ We also noted that such an approach is likely to be dependent on forecasts of costs and volumes, where the risk of forecast error seems high given uncertainty about the take-up of PIA at this stage.

Stakeholder responses

- 5.21 In their consultation responses, many stakeholders agreed that the flexibility afforded to BT under the current basis of charges condition is a concern.³⁹⁹ However, Openreach argued that the current pricing methodology and cost orientation obligation remain fit for purpose. It asserted that the cost orientation obligation already prevents excessive pricing over and above the tests set out under competition law and that in the medium to long run there would be little incentive or opportunity for Openreach to game the situation.⁴⁰⁰ Similarly, Virgin Media argued that BT's flexibility in setting rental charges is not a cause for concern.⁴⁰¹

Our reasoning and decisions

The current basis of charges condition on rental charges does not provide sufficient certainty

- 5.22 PIA rental charges are currently subject to a basis of charges condition, which requires that prices are reasonably derived from the costs of provision. This is based on a forward looking long run incremental cost approach, which allows an appropriate mark up for the recovery of common costs, including an appropriate return on capital employed. However, the basis of charges condition does not specify how precisely prices should be calculated.
- 5.23 The specific methodology currently adopted by Openreach to derive PIA rental charges is just one of a number of possible ways in which those charges could be set under the existing basis of charges condition. Openreach has freedom to revise the methodology with potentially significant impacts on the charges payable by PIA users. Openreach may, therefore, have scope to change the methodology in a way that might undermine the effectiveness of the remedy.
- 5.24 Under the current methodology, PIA rental charges generally comprise two parts: 'asset costs', which reflect a contribution to the cost associated with the underlying infrastructure to which access is granted;⁴⁰² and 'productisation costs', which reflect a contribution to the costs incurred by Openreach in setting up and managing the PIA product, and processing PIA orders.⁴⁰³ The asset cost element makes up a high proportion

³⁹⁹ The Advisory Committee for Scotland response to the 2016 PIA Consultation, page 3; Call Flow response to the 2016 PIA Consultation, page 4; CityFibre response to the 2016 PIA Consultation, page 13; Fermanagh and Omagh District Council response to the 2016 PIA Consultation, page 4; [3<]; GTC response to the 2016 PIA Consultation, page 13; Hyperoptic response to the 2016 PIA Consultation, page 17; Liquid Telecom response to the 2016 PIA Consultation, page 7; the PAG response to the 2016 PIA Consultation, page 45; Three response to the 2016 PIA Consultation, pages 8 to 9 and 13; Vodafone response to the 2016 PIA Consultation, paragraph 115; and Warwicknet response to question 6.1 of 2016 PIA Consultation.

⁴⁰⁰ Openreach response to the April 2017 PIA Consultation, paragraph 285.

⁴⁰¹ Virgin Media response to the 2016 PIA Consultation, page 14 to 15.

⁴⁰² As a result of our decision on the recovery of network adjustment costs, PIA rental charges will also include a contribution towards the costs of network adjustments going forward.

⁴⁰³ Rental charges for cable up a pole and pole top equipment do not currently include any productisation costs.

of overall rental charges (more than 50% in some cases⁴⁰⁴), so a change in the way this element is calculated could result in a significant change in rental charges.⁴⁰⁵

- 5.25 Openreach argued that all methodology changes in Openreach's regulated accounts are already charge controlled by Ofcom.⁴⁰⁶ However, the costs of physical infrastructure are only reported in the regulated accounts at a very aggregated level.⁴⁰⁷ Many other elements of the current methodology are not part of the regulated accounts and so are not subject to any charge controls by Ofcom. For example, Openreach has flexibility in determining how the aggregated costs in the regulated accounts are allocated to the different PIA rental products.⁴⁰⁸ Openreach also has flexibility to change how the costs allocated to the different PIA rental products are apportioned between PIA users and Openreach's own downstream products that use the physical infrastructure.⁴⁰⁹ Therefore, even without any changes in the allocation of costs in the regulatory accounts, Openreach currently has flexibility to materially change the level of PIA pricing.⁴¹⁰
- 5.26 Openreach further pointed out that the current pricing has been stable since launch.⁴¹¹ However, we do not consider past stability of PIA rental charges to be indicative of future price paths for various reasons. First, we are imposing changes in the treatment of productisation and network adjustment costs, which will significantly reduce PIA rental charges compared to those that have prevailed to date. Second, due to the low take-up of

⁴⁰⁴ Based on the updated PIA pricing model provided to Ofcom on 12 August 2016. Reflecting our decision that productisation costs should be recovered across all users of the physical infrastructure including Openreach (see Section 4) and after adding a contribution towards network adjustment costs based on the approach set out in Section 2, the overall proportion of asset costs on the total costs to be recovered through PIA rental charges would increase close to 100%.

⁴⁰⁵ When we imposed the PIA obligation in 2010, we said that our interpretation of the basis of charges condition would be that BT's prices must, as a first-order test, be between Distributed Long Run Incremental Cost (DLRIC) and Distributed Stand Alone Cost (DSAC). 2010 WLA Statement, paragraphs 5.58 and 5.79. Although only a first order test – and therefore not determinative of compliance or otherwise with the basis of charges condition – information provided by Openreach suggests that PIA rental charges based on DSAC would be between 1.2 and 3.2 times higher than the current PIA rental charges.

⁴⁰⁶ Openreach response to the April 2017 DPA Consultation, paragraph 285.

⁴⁰⁷ For example, BT reports the costs associated with all duct assets in aggregate, comprising lead-ins, spine duct, joint boxes, manholes and cabinets; and it reports the costs of poles in a single cost category with copper assets such as cables and joints.

⁴⁰⁸ For example, Openreach has flexibility to change any of the following: the allocation of the duct network asset costs reported in the RFS between spine duct, lead-in duct, manholes and joint boxes, and between various duct nest sizes of spine duct; the allocation of the copper network asset costs reported in the RFS between poles and other copper network assets; the allocation of the costs of manholes and joint boxes to chamber entries, in-line splices, distribution joints and cable coils hosted in chambers; and the allocation of the costs of poles between the various types of pole attachments (dropwires, aerial cables, pole top equipment or cables running up or down a pole).

⁴⁰⁹ For example, for duct, this is currently based on the actual space used by BT's cables and sub-ducts converted into the equivalent space that would be occupied by 25mm sub-ducts. For poles, this is currently based on the number of the different types of Openreach attachments and assumptions as to the number of additional PIA attachments.

⁴¹⁰ Openreach pointed out that we set out proposals to revise the RFS to show greater transparency of duct and pole costs. Although we are requiring changes to the reporting of physical infrastructure costs in the RFS, these changes will take a significant amount of time to implement and in any event will not cover every aspect of the PIA rental charge calculation. Openreach response to the April 2017 DPA Consultation, paragraph 285.

⁴¹¹ Openreach response to the April 2017 DPA Consultation, paragraph 285.

PIA to date, Openreach had little incentive in the past to increase prices.⁴¹² Indeed, in its consultation response, Openreach stated that the pricing stability to date has been commercially possible given relatively low demand.⁴¹³ In light of our objective of promoting investment in competing networks at scale, and the improvements to PIA that we envisage will result from our decisions in this Statement, we consider that Openreach is likely to have much stronger incentives than in the past to exploit this flexibility, in order to undermine investment in new infrastructure by competitors.

- 5.27 Openreach also argued that Ofcom has the ability and legal powers to intervene at any point, either via an own initiative compliance investigation or arising from a telecoms provider's complaint or dispute.⁴¹⁴ Similarly, Virgin Media argued that given Ofcom's vigilance and the ability of purchasers to complain, the risk of BT abusing its flexibility in the future is minimal.⁴¹⁵ However, we consider the prospect of addressing pricing issues through ex-post intervention is likely to be unattractive for telecoms providers contemplating long-term investments, as resolving these issues would take time and so create a period of uncertainty. We also note that, as set out above, adopting a different cost-oriented methodology could lead to different prices which may nevertheless still be consistent with the current basis of charges condition.
- 5.28 CityFibre, Openreach and Virgin Media pointed to international comparisons of PIA rental charges, arguing that current pricing is in line with international benchmarks.⁴¹⁶ The PAG disagreed with this, arguing that the comparison needs to take into account rental as well as ancillary charges. It stated that many of the ancillary charges levied by Openreach are not cost-based, and very few are typically levied for similar activities in other jurisdictions. It also noted the limited value of international comparisons.⁴¹⁷ Even if current pricing is in line with international benchmarks, we do not consider that this addresses our concern about BT's ability to change prices in a way that might undermine the effectiveness of the remedy.⁴¹⁸ To the extent that Openreach is arguing that we should not be imposing caps below the current level of rental charges, this is largely a result of our decision to change the treatment of productisation costs. We explain why this change is necessary in Section 4.
- 5.29 For the above reasons, we remain of the view that the current basis of charges condition will not be effective in addressing the risk that BT might exploit its SMP by setting rental charges at an excessively high level. In particular, we do not think that a basis of charges

⁴¹² For example, less than 1% of the total length of Openreach duct route is currently rented to PIA users. Ofcom calculation based on Openreach response to question 23 of the 2nd WLA s.135 notice issued on 21 December 2017 and Openreach response to question 12a of the WLA s.135 notice issued on 16 June 2017.

⁴¹³ Openreach response to the 2016 PIA Consultation, paragraph 287.

⁴¹⁴ Openreach response to the April 2017 DPA Consultation, paragraph 285.

⁴¹⁵ Virgin Media response to the 2016 PIA Consultation, pages 14 to 15.

⁴¹⁶ CityFibre response to the 2016 PIA Consultation, page 3; Openreach response to the 2016 PIA Consultation, paragraph 269; Virgin Media response to the 2016 PIA Consultation, page 14.

⁴¹⁷ The PAG response to the 2016 PIA Consultation, paragraphs 6d and 85.

⁴¹⁸ In any event, we note that while international benchmarks can be informative, their value is not conclusive due to the limited comparability across national markets.

condition provides investors with sufficient certainty as to the level of PIA rental charges they would face.

A price cap on PIA rental charges is required

5.30 We consider that our duties are best met by addressing the excessive pricing risk we have identified through a cap on rental charges, as this will provide investors with greater certainty over the level of PIA rental charges and thus facilitate building a credible business case for deploying a network using PIA.

5.31 While in some other charge controls we have applied a price cap based on BT's fully allocated costs, we do not consider this to be practicable for PIA rental charges for this review period, for a number of reasons:⁴¹⁹

- a) The necessary cost data is not reported to the required level of granularity in BT's accounting systems. For example, Openreach sets different PIA rental charges for different types of duct on a per metre basis, as well as separate rental charges for using manholes and joint boxes. However, BT's accounting systems report the costs of duct, manholes and joint boxes in aggregate. Obtaining data on the granularity required, which might include making changes to the way BT reports physical infrastructure within its regulatory financial accounting systems, could take a significant amount of time to implement.
- b) The lack of granular cost data also means that it would be challenging to set PIA rental charges for the current products at a level which would ensure that other telecoms providers are not disadvantaged compared to Openreach, whose downstream products do not currently consume PIA. Specifically, it is not currently possible to accurately compare the contribution to cost recovery made by BT's downstream products with the contribution made by other telecoms providers using PIA.⁴²⁰ BT would need to change the way it reports physical infrastructure within its regulatory financial accounting systems to be able to do this. This could take a significant amount of time for Openreach (in discussion with us) to investigate and implement.
- c) Such an approach is likely to be dependent on forecasts of costs and volumes. Given the uncertainty about take-up of PIA by other telecoms providers at this stage, our view is that the risk of forecast error seems high.⁴²¹

⁴¹⁹ A number of stakeholders expressed a desire for a full-fledged, cost-based charge control. While we recognise the potential benefits of adopting such an approach, for the reasons set out here, this is not currently practicable. The PAG response to the 2016 PIA Consultation, paragraphs 6d, 80, 81d and 91; TalkTalk response to the August 2017 DPA Consultation, paragraph 2.1; Three response to the 2016 PIA Consultation, page 14; Vodafone response to the 2016 PIA Consultation, paragraph 124.

⁴²⁰ BT does not currently report the costs of the physical infrastructure assets consumed internally to the same level of detail as the PIA products offered externally. For example, Openreach sets different PIA rental charges for different types of duct on a per metre basis, as well as separate rental charges for using manholes and joint boxes. However, BT does not report its internal consumption of duct at this level of detail; rather, BT's downstream products contribute to duct, joint box and manhole costs in aggregate and on a per line basis (with the level of this contribution varying by end product).

⁴²¹ We note that Openreach argued that a CPI-X charge control would not be appropriate due to the uncertainty on future volumes and costs. Openreach response to the April 2017 DPA Consultation, paragraph 291.

- 5.32 In our April 2017 DPA Consultation, we considered a number of alternative approaches to provide greater certainty on the level of rental charges, including:
- imposing a cap on rental charges based on BT’s current methodology (albeit with some changes).
 - imposing a basis of charges condition similar to the one currently in place, but supplemented with further guidance on the approach we would take as a starting point to assessing PIA rental charges under the basis of charges condition, potentially specifying particular aspects of the methodology we might adopt.
- 5.33 We remain of the view that imposing a cap on rental charges using the current methodology as a starting point for our calculations is likely to be an appropriate approach in this review period. In particular, this would be an effective means of providing certainty to investors over the market review period and would result in PIA rental charges being at a level which should avoid undermining network investment.
- 5.34 Many stakeholders considered some form of a price cap or charge control desirable. Hyperoptic⁴²², the PAG⁴²³, TalkTalk⁴²⁴, Three⁴²⁵ and Vodafone⁴²⁶ supported a price cap. Virgin Media agreed that some form of ‘safeguard cap’ would protect the users of ducts and poles⁴²⁷, while CityFibre considered that a ‘safeguard charge control’ seems to strike the right balance between the various objectives that Ofcom has identified with regards to the level of charges.⁴²⁸
- 5.35 Openreach objected to the imposition of a cap on a number of grounds, including the following:
- a) Openreach argued that the strength of the current basis of charges obligation and the methodology used, was that it was intended to set a broadly fair and stable allocation of costs to users of PIA given the uncertainties associated with future take-up, not dissimilar to today’s situation. It highlighted the risks of setting an artificially low price, encouraging initial investment that may not be sustainable if prices need to readjust and/or restricting investment in economically viable technologies and markets.⁴²⁹ We address these risks when setting the methodology for calculating PIA rental charges in Annex 25.

⁴²² Hyperoptic response to the April 2017 DPA Consultation, page 12; Hyperoptic response to the August 2017 DPA Consultation, page 8.

⁴²³ The PAG response to the 2016 PIA Consultation, paragraphs 6d and 81a.

⁴²⁴ TalkTalk response to the 2016 PIA Consultation, paragraph 4.9; TalkTalk response to the April 2017 DPA Consultation, paragraph 6.3; TalkTalk response to the August 2017 DPA Consultation, paragraph 1.3.

⁴²⁵ Three response to the 2016 PIA Consultation, Section 4.

⁴²⁶ Vodafone response to the 2016 PIA Consultation, paragraph 124a; Vodafone response to the April 2017 DPA Consultation, paragraph 30a.

⁴²⁷ Virgin Media response to the April 2017 DPA Consultation, page 3.

⁴²⁸ CityFibre response to the 2016 PIA Consultation, page 3.

⁴²⁹ Openreach response to the 2016 PIA Consultation, paragraphs 284 and 290; Openreach response to the April 2017 DPA Consultation, paragraphs 295 to 296.

- b) Openreach also raised a concern that a price cap, while reducing uncertainty by removing the risk for telecoms providers of a price increase, is ‘by its nature’ an asymmetric treatment of risk – if the price cap is too tight and the underlying costs increase, then Openreach faces a risk of under-recovery of its legitimate and efficiently incurred costs.⁴³⁰ We disagree with this view. Openreach’s current methodology for calculating the asset cost component of PIA rental charges – which we have used as a starting point in setting the level of charges for this review period (see below) – is based on the annual costs reported in the latest Regulatory Financial Statements (RFS). There is no indication that these costs (adjusted for inflation⁴³¹) are systematically higher or lower than the costs to be incurred in this review period. Although the actual costs in each year of this review period are likely to differ from the latest RFS, the difference may be in either direction. Therefore, while there is a risk of under-recovery, there is also a prospect of over-recovery for Openreach, and there is no evidence of a systematic bias in either direction.⁴³²

5.36 Stakeholders suggested a number of alternative approaches, but we remain of the view that these are less appropriate in this case for the following reasons:

- a) Supplementing the current basis of charges condition with guidance would unlikely be effective in that it would not provide the level of certainty needed by investors in the context of large scale network investments. Any guidance would rely on the *expost* dispute mechanism, which can take a significant amount of time to resolve, thus extending the period of uncertainty to a point at which telecoms providers might find it difficult to build a credible business case.⁴³³
- b) Other alternatives, such as supplementing the current basis of charges condition with a cap on annual price changes⁴³⁴ or mandating long-term contracts, are unlikely to be effective without also controlling the level of charges at the start. Although future price changes would be limited to some extent, we consider that the current treatment of productisation costs undermines the effectiveness of the remedy (see Section 4).
- c) Some stakeholders suggested regulating charges for a longer time period (for example, by stipulating that the rental price cap set at the beginning of the review period) should be considered the long-term maximum price. However, uncertainty about future take-

⁴³⁰ Openreach response to the April 2017 DPA Consultation, paragraph 289.

⁴³¹ The maximum charges we are setting are applicable from 1 April 2018. In each subsequent year, the maximum charges will be updated for inflation, measured using the Consumer Prices Index (CPI).

⁴³² Openreach further pointed out that many of the activities underpinning PIA are based on costs that do increase each year such as labour rates, whether for direct labour or work undertaken using civil contractors. However, in setting a cap, we can allow for changes in underlying costs. Openreach response to the April 2017 DPA Consultation, paragraph 294. To allow for changes in the underlying costs over the review period, we have decided to adjust the price cap for CPI inflation each year.

⁴³³ Openreach maintained that the current cost orientation obligation, with further guidance on how costs should be treated, remains a suitable approach. Openreach response to the April 2017 DPA Consultation, paragraph 286.

⁴³⁴ Openreach suggested that an alternative option which could offer a balance of certainty for telecoms providers and flexibility for Openreach would be a price cap set with a price ceiling at current price plus X% sufficient to cover potential cost increases. Openreach response to the April 2017 DPA Consultation, paragraph 290.

up of PIA and changes in costs make forecasting challenging, giving rise to particular difficulties in attempting to specify prices over an extended period.⁴³⁵ Even if we were to do this, the cap would be subject to review at start of each subsequent review period, limiting the degree of certainty provided.

- d) In its response to the April 2017 DPA Consultation, Openreach suggested that future changes in the methodology for cost allocation could be addressed by a condition in the legal instrument that any change in pricing methodology needs to be agreed with Ofcom prior to implementation.⁴³⁶ However, we do not consider this solution would provide investors with sufficient certainty as to the future level of PIA rental charges, which is the primary reason for imposing a price cap.

Our approach to using the current methodology

5.37 In what follows, we set out how we use the current methodology to calculate the maximum charges that should apply to PIA rental products for this review period.

5.38 Our main objective in using the current methodology is to provide certainty for the duration of this review period, in the expectation that more granular information will be available in future review periods.⁴³⁷ Given limitations in the granularity of information available at this stage, and uncertainty about the take-up of PIA, we do not believe determining our own methodology in this review period would lead to a more appropriate outcome in terms of the level of the maximum charges set.⁴³⁸ As this provides certainty for a period of time, our approach has been not to depart from the current methodology unless it is clearly inappropriate.

5.39 An important consideration for us in adopting the methodology is its appropriateness as a transitional approach to any price regulation of PIA that Ofcom adopts in the future. We recognise that certainty over the level of charges in the long-term is important to potential investors, given the investment case for network deployment is typically evaluated over a relatively long time period.⁴³⁹ We cannot prejudge what actions we will take in the future, as any pricing decisions in future reviews will be made in light of the circumstances – such as how the physical infrastructure will be used by other telecoms providers and Openreach

⁴³⁵ In a further consultation, we will consider more fully the period over which the price cap should apply.

⁴³⁶ Openreach response to the April 2017 DPA Consultation, paragraph 285.

⁴³⁷ We are working with BT and Openreach to make changes to the way BT reports physical infrastructure within its regulatory financial accounting systems. However, such changes are likely to take some time to investigate and implement.

⁴³⁸ In setting charges, we must do so in accordance with our duties and the legal tests set out in the Communications Act 2003, including setting such conditions as appear appropriate to us for the purposes of promoting efficiency, promoting sustainable competition and conferring the greatest possible benefit on end-users. We must also take account of the extent of BT's investment in its physical infrastructure. Communications Act 2003, section 88. We explain why we consider that our proposals satisfy these legal tests later in this section. We recognise that when the current methodology was implemented in 2011, it was intended to set a broadly fair and stable allocation of costs to users of PIA given the uncertainties associated with future take-up.

⁴³⁹ Indeed, some telecoms providers have called for us to fix the level of the cap significantly beyond the duration of this review period (e.g. ten years). Given limitations in the granularity of information available at this stage, and uncertainty about the take-up of PIA, we do not think this would be appropriate. Even if we were to do this, the cap would be subject to review at start of each subsequent review period, limiting the degree of certainty provided.

in future – and legal framework applicable at that time. However, while it is not possible to give long-term certainty as to future PIA price levels, we think our application of the current methodology is reasonable, and results in charges which appear overall to be appropriate.⁴⁴⁰

- 5.40 Moreover, although we are setting maximum charges to apply only for the duration of the next review period, our decision seeks to implement our longer-term strategy to promote greater network competition and therefore we expect future reviews to consider how any pricing decisions can support this goal. More generally, we recognise the importance of regulatory consistency and predictability over time. We think that investors will place considerable weight on us providing effective constraints on Openreach's ability to set inappropriate charges in the long-term and in the short-term, to the extent BT continues to have SMP.
- 5.41 The PAG argued that our approach of not departing from the current methodology unless it is clearly inappropriate grants BT discretion about how its costs should be attributed and the level of regulated charges. In particular, BT will be able to use this flexibility to its advantage to overstate costs.⁴⁴¹ We disagree. We are taking the methodology adopted by Openreach in 2011 as our starting point.⁴⁴² BT does not have discretion to amend the methodology used to set maximum charges in this review period.

Form of control

- 5.42 In what follows, we set out our decisions on the form of the proposed cap on rental charges. Specifically, we have decided that:
- a) maximum charges are calculated for each PIA rental product;
 - b) the maximum charges apply from the start of the review period; and
 - c) the maximum charges will be updated for inflation each year.

Setting a price cap on each of the current PIA rental products

- 5.43 Openreach currently calculates rental charges for PIA products which relate to the different ways in which the physical infrastructure can be used:
- Duct rental (per metre) – different rates apply for lead-in duct, spine duct in a route containing a single bore, spine duct in a route containing two bores, and spine duct in a route containing three or more bores.⁴⁴³

⁴⁴⁰ In particular, the overall share of the underlying costs of the physical infrastructure which is expected to be recovered from PIA, as opposed to Openreach's downstream products, seems appropriate. In addition to the question of sustainability of the level of charges, we would also be concerned if we knew our approach was likely to result in charges which did not represent a level playing field between Openreach and other telecoms providers, in terms of the share of physical infrastructure costs recovered from each.

⁴⁴¹ The PAG response to the August 2017 DPA Consultation, paragraph 31.

⁴⁴² We have made a number of changes to the methodology, as set out in this Statement.

⁴⁴³ Rental is for sub-duct of diameter up to 25mm. With respect to lead-ins, where a lead-in passes into a 90mm duct from an Openreach junction box hosting the copper distribution point, there is a 'lead-in link' product. For this product, spine duct rates apply for the portion of the route from the junction box to the swept-tee joint or frontage-tee joint. Lead-in rates apply thereafter.

- Pole rental (per attachment) – different rates apply depending on whether the attached cable serves a single end-user (i.e. a single drop) or multiple end-users (i.e. a carrier cable). Separate rental charges are levied for placing equipment at the top of a pole (known as ‘manifolds’), and for each cable that runs down or up a pole.
- Hosting cables and splices in joint boxes and manholes – there are three products: (i) rental for each sub-duct entering or exiting from the joint box or manhole; (ii) rental for in-line splice hosting (per splice); (iii) rental for housing a cable coil, with different rates depending on the length of cable. For all three products, different rates apply for joint boxes and manholes.

5.44 We set a maximum charge for each of these products, reflecting the fact that the current methodology calculates charges for each product.

5.45 Some telecoms providers have called for a simplification of rental charges, suggesting that the complexity of PIA is a significant barrier to its use.⁴⁴⁴ We recognise that there may be some advantages to simpler charges. However, we have no evidence that the current structure of charges would be a barrier to using PIA and it is not clear that any of the proposed alternatives are superior to the current approach.⁴⁴⁵ Moreover, there are reasons to adopt the more disaggregated approach under the current methodology. For example:

- Disaggregation of charges by duct nest size (i.e. the number of bores) reflects differences in the cost of duct depending on the number of duct bores, as reflected in the absolute valuation of duct assets. We have no evidence that this approach leads to distorted market signals.
- Setting separate charges for dropwire attachments and aerial cable attachments means that the rental charges reflect the different utilisation of different pole types in the network. Poles with cable attachments carry on average fewer attachments per pole compared to poles with dropwire attachments.⁴⁴⁶ Thus, charges for cable attachments need to be higher than charges for dropwire attachments to recover the costs of the different types of poles.
- Charging separately for different pole attachments encourages more efficient use of the space available on poles. In particular, if a telecoms provider wishes to connect several premises to a pole, they will be incentivised to use pole top equipment to aggregate incoming cables as it is cheaper than running separate cables down the pole.

⁴⁴⁴ For example, telecoms providers proposed setting a single per metre charge for spine duct irrespective of the number of bores, removing charges for entering and existing chambers and recovering these costs within the per-metre duct charge, introducing a simpler charge per fibre joint within a chamber and each microduct radiating from the fibre joint to connect the end customer, setting a simpler charge per pole-mounted fibre distribution point, and setting a single charge per cable attachment irrespective of whether it is a single drop cable or an aerial cable. Flomatik response to the August 2017 DPA Consultation, pages 2 to 3; Hyperoptic response to the August 2017 DPA Consultation, page 8; TalkTalk response to the August 2017 DPA Consultation, paragraphs 2.8 and 2.9. CityFibre argued that although there may be benefits from aggregating some products, it should be based on actual experience of how the products are used through large scale deployment. CityFibre response to the August 2017 DPA Consultation, paragraph 4.1.4.

⁴⁴⁵ Indeed, a number of telecoms providers are already using PIA, and telecoms providers have told us that they expect to use PIA at scale in the knowledge of our proposal not the change the current structure of charges.

⁴⁴⁶ Aerial cables support multiple premises whereas dropwires typically support a single premises.

- 5.46 Therefore, we remain of the view that the current structure of rental charges is appropriate as a basis for providing certainty over the level of rental charges for the next review period. We can revisit the structure of PIA rental charges in future review periods when evidence of how PIA is used at scale becomes available.
- 5.47 We recognise that it is possible that Openreach and other telecoms providers may wish to introduce new ways in which the physical infrastructure can be used and for which there is currently no rental product.⁴⁴⁷ However, in our view, the current product set which has been in place since 2011 captures the ways in which Openreach’s physical infrastructure is most likely to be used. In any event, our approach does not prevent Openreach from allowing the infrastructure to be used in new ways, nor does it prevent Openreach from introducing new rental products with associated rental charges.⁴⁴⁸
- 5.48 We have decided to retain the existing basis of charges condition in respect of any new rental charges Openreach introduces which would not be covered by the cap to address the excessive pricing risk we have identified. This requires that charges are reasonably derived from the costs of provision based on a forward looking long run incremental cost approach, allowing an appropriate mark up for the recovery of common costs, including an appropriate return on capital employed. In considering whether charges for new rental products comply with the basis of charges condition, we would take into account the charges which are covered by the cap.⁴⁴⁹

Price cap will apply from the start of the review period

- 5.49 Although we are imposing a price cap based on the current methodology, we are making certain changes that will result in changes to the current level of charges. Therefore, we have considered how charges should evolve from their current levels to the maximum charges we impose. We have decided that the maximum charges should apply from the start of the review period.⁴⁵⁰
- 5.50 Although we generally prefer glidepaths⁴⁵¹ for price stability and their cost reduction incentives, these considerations are not as important in the present circumstances, and

⁴⁴⁷ For example, Openreach decided in 2016 to allow telecoms providers to install a wider range of cable joints in Openreach manholes and joint boxes.

⁴⁴⁸ Openreach cannot introduce products which are essentially equivalent in order to circumvent the control on pricing.

⁴⁴⁹ For example, if charges for new rental products were to comprise a contribution to asset costs already included in the calculation of the maximum charges for existing rental products, it may be the case that this would only be reasonable if PIA rental charges for certain existing products were set lower than the maximum charge. This is because the current methodology calculates PIA rental charges on the basis of an allocation of costs between the current product set (i.e. assuming costs will not be recovered from other products). In some situations, Openreach could allow new uses of the infrastructure without charging specific rental charges, where the new use is complementary to an existing rental product. This is because the telecoms provider will still make a contribution to the costs of the infrastructure through paying rental charges for the existing rental products.

⁴⁵⁰ In Section 7 we decide that the new PIA rental charges will come into effect by 1 May 2018 to allow Openreach to make necessary administrative changes to the PIA Reference Offer.

⁴⁵¹ Glidepaths involve setting the control so that there is a gradual convergence of charges from the current level to the target level.

there is a strong case for aligning charges with costs quickly to ensure the PIA remedy is effective. This is because:

- Although glidepaths can help ensure a stable and predictable background against which investment decisions may be taken, we consider that price stability at the start of this review period is less important, as the current PIA remedy has been ineffective with relatively low take-up historically.⁴⁵² As explained above, we see price stability as an important consideration going forward.
- In other charge controls, we have expressed the concern that aligning charges with costs immediately could undermine incentives to reduce costs.⁴⁵³ However, the most important driver of the difference between the current rental charges and the maximum charges we propose reflects a change we are making to the methodology, rather than changes in the underlying costs.⁴⁵⁴ Specifically, we have reflected in the calculation of maximum charges our decision that the costs incurred in setting up and managing the remedy ('productisation' costs) should be recovered from all users of the physical infrastructure, to ensure a level playing field with the costs faced by Openreach itself when using the infrastructure. We consider that this change is required to ensure the effectiveness of the remedy, and should therefore be reflected in charges as soon as possible.⁴⁵⁵

Price cap will be updated for inflation each year

5.51 We have decided that the maximum charges will apply for the duration of the review period. In each year the maximum charges will be updated for inflation to allow for changes in the underlying costs due to inflationary pressure over the review period. As proposed in the August 2017 DPA Consultation, we use the Consumer Price Index (CPI) to measure inflation. We note that none of the stakeholders objected to using this measure of inflation.⁴⁵⁶

Calculation of maximum charges

5.52 Our calculation of the maximum charge for each product comprises three components:

- asset costs;
- network adjustment costs; and

⁴⁵² Our decision with respect to rental charges is made in the context of a number of other changes to the PIA remedy, which together are expected to have a significant bearing on investment decisions.

⁴⁵³ One-off adjustments reduce the period of time over which the regulated firm benefits from cost reductions made prior to the new control period, reducing the incentives to make efficiency improvements in the first place. Likewise, if costs have increased, allowing a rapid rise in charges would signal that cost increases would quickly be passed through to charges, reducing the regulated firm's incentive to control costs.

⁴⁵⁴ Although the underlying costs have changed, the impact of this is to increase charges in some cases and decrease charges in others. In most cases this is relatively modest compared to the change in the treatment of productisation costs (except for the charges for cable up pole and pole top equipment, which do not currently attract any productisation costs).

⁴⁵⁵ We have also corrected a number of technical errors in the calculation, which we think should be reflected in charges as soon as possible.

⁴⁵⁶ Openreach pointed out that many of the activities underpinning PIA are based on costs that do increase each year such as labour rates, whether for direct labour or work undertaken using civil contractors. Openreach presented no evidence that the expected growth in costs, net of any efficiency improvements expected over the review period, will be above CPI inflation. Openreach response to the April 2017 PIA DPA Consultation, paragraph 294.

- productisation costs.
- 5.53 The asset cost component reflects a contribution to the costs associated with the underlying asset to which access is granted. Our calculation of this component is based on the current methodology, which specifies what proportion of the total cost associated with the asset type (e.g. duct) should be recovered from the telecoms provider gaining access through the different rental products.
- 5.54 The network adjustment cost component reflects a contribution to the costs associated with necessary adjustments undertaken to make Openreach's physical infrastructure ready for use, which we have decided Openreach should recover across all users of the physical infrastructure, up to a financial limit. These costs are essentially asset costs, but as this is a new category of costs which Openreach has not incurred to date, these costs are not reflected in the asset cost component under the existing methodology. Therefore, we have included an allowance for a proportion of these costs in the calculation of maximum charges.
- 5.55 The productisation cost component reflects a contribution to the costs incurred in setting up and managing the PIA product, and processing individual PIA orders. Under the current methodology, forecast productisation costs are allocated to PIA rental products based on an expectation that these costs would be recovered exclusively from telecoms providers using PIA. We have decided that productisation costs should be recovered across all SMP products that use the physical infrastructure (including PIA), in the same way Openreach recovers similar costs related to its own use of the physical infrastructure. Therefore, we have replaced the existing productisation cost component with our own calculation of an allowance for a proportion of these costs.
- 5.56 In what follows, we explain how each of the three components has been calculated.

Calculation of the asset costs component

- 5.57 We describe in detail the methodology we have applied to calculate the asset cost component of PIA rental charges in Annex 25. At a very high level, there are two main steps to the calculation:
- First, the regulatory cost base is determined for the relevant infrastructure being accessed (i.e. lead-in duct, spine duct⁴⁵⁷, poles, joint boxes or manholes).
 - Second, the methodology determines what share of this cost should be included in the PIA rental products which make use of the relevant infrastructure.
- 5.58 Below, we provide an overview of these two steps, and comment on specific aspects where we have made changes to the current methodology, or where stakeholders raised issues in response to our consultations. As explained above, our approach has been not to depart from the current methodology unless it is clearly inappropriate.

⁴⁵⁷ The regulatory cost base is determined for each of single bore spine duct, 2 bore spine duct and 3+ bore spine duct. For convenience, we sometimes just refer to spine duct.

Determining the relevant regulatory cost base

- 5.59 The regulatory cost base for the relevant infrastructure being accessed comprises a return on capital, depreciation (net of holding gains) and overheads, based on Openreach's forward looking costs.⁴⁵⁸ These cost items are taken from BT's RFS, or from the systems which feed into the RFS.
- 5.60 Under the current methodology, the cost data used is based on a snapshot at a particular point in time. In setting maximum charges based on forward looking costs to apply over a number of years, we would usually look to forecast costs covering the period to which the control relates. However, BT does not report physical infrastructure costs or volumes at the required level of granularity to enable us to forecast these costs in the way we typically forecast costs in other charge controls. For present purposes, we think the approach of basing the asset costs on a recent snapshot of data is appropriate. This is because any under-recovery or over-recovery resulting from changes in costs over the review period is unlikely to be material, given the likely scale of PIA usage relative to Openreach's internal consumption of physical infrastructure, and it does not appear that the risk of under- or over-recovery is asymmetric.^{459 460}
- 5.61 For the purposes of calculating the maximum rental charges for this review period, we have used cost inputs for the financial year 2016/17 (i.e. the most recent year for which RFS information is available). To calculate the return on capital, we have used our current estimate of the weighted average cost of capital (WACC) – see Annex 20. We have used the Openreach Copper WACC, which we consider to be the most appropriate assumption for the purposes of controlling PIA prices over this review period, as this WACC most closely reflects the risk associated with physical infrastructure.⁴⁶¹

⁴⁵⁸ The asset cost component uses data from BT's RFS, which is based on a current cost accounting (CCA) cost approach that uses financial capital maintenance (FCM) and the fully allocated cost (FAC) standard. As well as allowing for depreciation of the historical cost of an asset, current cost accounting methods also have supplementary depreciation, which allows for changes in the asset valuation. This can be positive (if the asset has appreciated in value) or negative (if it has declined in value). The FCM approach seeks to maintain the value of originally invested capital. For modelling purposes, this involves including an allowance within the capital costs for the holding gains or losses associated with changes over the year in the value of the assets held by the firm. Holding gains (or losses) are subtracted (or added) from (or to) the depreciation charge.

⁴⁵⁹ Even if we were to attempt forecasting asset costs, it is not clear that this would reduce this risk of under- or over-recovery given the risk of forecast error. In particular, we observe that over the past ten years, the net replacement costs of duct and copper (in which pole costs sit) have increased in some years and decreased in others. Although asset costs can be expected to increase as a result of network adjustments, we capture these costs in a separate component in the calculation (see below). See Openreach response to questions 12 and 18 of the WLA s.135 notice issued on 12 June 2017.

⁴⁶⁰ Under the current methodology, holding gains are subtracted from the annual costs and added to the value of the asset. We recognise that by not forecasting costs over the review period, we are not reflecting the increase in annual depreciation charges and the increase in the return on capital in subsequent years which result from the holding gain. As such, we may be potentially understating costs in subsequent years by a small amount. We do not think the impact on rental charges, or on Openreach's cost recovery, is sufficiently material to warrant taking a more complex approach based on forecasts of costs over the review period. We note that PIA volumes are expected to account for only a relatively small proportion of the recovery of physical infrastructure costs over this review period compared to Openreach's downstream services.

⁴⁶¹ Although PIA is intended to be used for the deployment of ultrafast broadband networks, the riskiness of the ultrafast investment is not the same as the risk associated with the underlying physical infrastructure shared by a number of

- 5.62 We have included both directly attributed overheads and indirectly attributed overheads in the regulatory cost base.⁴⁶² The current methodology does not include the latter. We remain of the view that the exclusion of these costs is not appropriate.⁴⁶³ Including indirectly attributed overheads reflects a more consistent treatment of overheads between the calculation of maximum PIA rental charges and the RFS, and is therefore consistent with promoting competition by creating a level playing field between Openreach and other telecoms providers.⁴⁶⁴ This has the effect of increasing the regulatory cost base of duct assets and pole assets compared to the current methodology.
- 5.63 In its RFS, BT does not report costs at the level of the relevant types of infrastructure being accessed (lead-in duct, spine duct, manholes, joint boxes, poles) but rather reports these infrastructure costs at a greater level of aggregation. Following BT's current methodology, we have split these costs using separate estimates of the gross replacement cost (GRC) of each of these different types of infrastructure:
- a) BT reports the costs associated with all duct⁴⁶⁵ assets in aggregate, comprising lead-in duct, spine duct, manholes, joint boxes and cabinets.⁴⁶⁶ We split this aggregate cost between these different types of infrastructure in proportion to their GRC, as estimated in a bottom-up valuation based on September 2015 volumes and 2012/13 prices.⁴⁶⁷ Similarly, we split the cost of spine duct between the relevant duct nest sizes in proportion to their GRC, as estimated in a bottom-up valuation carried out in 2009/10.⁴⁶⁸ We have not updated the GRC figures for the financial year 2016/17 as

services. Physical infrastructure is needed for all services, so the demand is not dependent on the success of ultrafast broadband.

⁴⁶² Directly attributed overheads capture all operating costs directly attributed from the general ledger to the relevant activity or plant groups in BT's accounting system (e.g. the duct activity groups). Indirectly attributed overheads consist of other operating costs which are indirectly attributed to the relevant activity or plant groups from other activity groups – this includes general overheads including a proportion of costs relating to BT's internal service unit, Technology, Service & Operations (TS&O).

⁴⁶³ Openreach subsequently identified this omission. See Openreach response to question 13e of the WLA s.135 notice issued on 27 January 2017.

⁴⁶⁴ In the RFS, indirectly attributed overheads are ultimately attributed to Openreach's downstream services which consume the physical infrastructure. Excluding these overheads from the PIA price calculation would not result in a level playing field between Openreach and other telecoms providers using PIA, as Openreach's downstream services would contribute to overheads which other telecoms providers using the physical infrastructure would not contribute to.

⁴⁶⁵ This includes all duct costs rather than just those that relate to the access network, on the basis that a telecoms provider constructing a rival network using PIA might use any part of the Openreach duct network in its network deployment. See Openreach response to question 6 of the WLA s.135 notice issued on 27 January 2017.

⁴⁶⁶ We have excluded from the calculation of PIA rental charges the costs associated with cabinets as these assets are not part of PIA. These costs appear to have been included in the regulatory cost base of spine duct under the current methodology, although we note they represent less than 1% of the total duct valuation. See Openreach response to question 23 of the WLA s.135 notice issued on 16 June 2017.

⁴⁶⁷ The current methodology proceeds on the assumption that the GRC of duct as estimated in the absolute valuation does not include any lead-in duct. The GRC for lead-in duct is then estimated separately (see Annex 25). In the absence of more granular data, we consider this approach to be appropriate.

⁴⁶⁸ Openreach provided us with an updated valuation split by duct nest size based on 2012/13 prices and September 2015 volumes. However, this shows an anomalous cost per km of 2-bore spine duct compared to the other duct nest sizes. Given this anomaly and the fact that this valuation was not used to produce the RFS, we have decided to rely on the 2009/10 bottom-up valuation to split the costs of spine duct into the different duct nest sizes.

doing so would require BT to perform an absolute re-valuation of the duct asset.⁴⁶⁹ We consider that this is unlikely to have a sufficiently material impact on rental charges to warrant undertaking such an exercise.⁴⁷⁰

- b) BT reports the costs of poles in a single cost category with copper assets such as cables and joints. The pole costs are split out from the copper assets in proportion to the gross replacement cost, as estimated in a bottom-up valuation carried out in 2009/10.⁴⁷¹ We have not updated the gross replacement cost figures for the financial year 2016/17, as doing so would require BT to perform an absolute re-valuation of the relevant assets.⁴⁷² As in the case of duct assets, we consider that this is unlikely to have a sufficiently material impact on rental charges to warrant undertaking such an exercise.⁴⁷³

- 5.64 The PAG argued that relying on outdated cost inputs is in breach of our legal obligation to use the best available evidence when – at the very least – data from 2015/16 is available to it.⁴⁷⁴ We disagree. We rely on the most recent (2016/17) RFS data when calculating the regulatory cost base. However, this data is reported at a highly aggregated level. To split the RFS costs to the relevant duct and pole asset types, we use more granular data that is not available from the RFS but is produced separately and is based on an absolute valuation of these assets. As explained above, we have relied on the most recent absolute valuations which we consider to be reliable.

Determining the share of the regulatory cost base to include in PIA rental charges

- 5.65 The methodology for determining what share of the regulatory cost base should be included in each of the PIA rental products which make use of the relevant infrastructure differs between the different types of PIA products. In general, this step in the calculation of the asset cost component relies on information about Openreach's physical infrastructure (e.g. the number of kilometres of a particular duct type, or the number of attachments on a pole), as well as a number of assumptions made by Openreach at the time of the original calculation. We have used physical infrastructure data consistent with

⁴⁶⁹ BT moved to valuing duct on an indexed historic basis in 2012/13. See Openreach response to question 15 of the WLA s.135 notice issued on 16 June 2017.

⁴⁷⁰ We have compared the 2009/10 absolute valuation to partially updated figures based on 2012/13 prices and September 2015 volumes, as provided by Openreach, and have also updated the estimate of the gross replacement cost of lead-in duct. We note that the resulting split (in percentage terms) of the aggregate cost between the relevant types of infrastructure being accessed has not changed materially since the 2009/10 absolute valuation.

⁴⁷¹ This ratio is also used to split some categories of overhead costs that are reported for all copper assets in aggregate. See Annex 25 for more detail.

⁴⁷² BT moved to valuing copper on an indexed historic basis in 2012/13.

⁴⁷³ Following our August 2017 DPA Consultation, we asked Openreach to provide us with a split of poles versus other copper assets based on the 2012/13 absolute valuation. Openreach clarified that the last absolute valuation of the copper assets, performed in 2012/13, was not subject to the same level of scrutiny as the valuation performed in 2009/10 (e.g. it has not undergone an audit as it was not used to produce the RFS), nor does it reconcile back to the 2012/13 RFS. Also, it is based on a lower number of poles that does not correspond to the data currently recorded in Openreach's systems. However, if extrapolated to the total number of poles consistent with Openreach's current records, it results in a percentage split similar to the value based on the 2009/10 absolute valuation. See Openreach response to question 8 of the 2nd WLA s.135 notice issued on 21 December 2017.

⁴⁷⁴ The PAG response to the August 2017 DPA Consultation, paragraph 38.

the timing of the cost data (i.e. corresponding to the financial year 2016/17).⁴⁷⁵ We have also sought to cross-check Openreach's assumptions against recent data or information where available.

Share of the regulatory cost base to include in duct and box-related products

- 5.66 For each type of duct (lead-ins, single bore spine, 2 bore spine and 3+ bore spine), the share of the regulatory cost base that is reflected in the asset cost component for renting that type of duct is based on the proportion of utilised space that would be taken up by a 25mm diameter sub-duct. Specifically:⁴⁷⁶
- The regulatory cost base for each type of duct is divided by the national average number of 25mm diameter sub-duct equivalents in that type of duct.⁴⁷⁷
 - The resulting portion of the regulatory cost base is then divided by the total route metres of that type of duct, to give a cost per metre.
 - The asset cost component is equal to this cost per metre. In the case of spine duct, this is subject to a cap at 50% of the total regulatory cost per metre, which ensures that PIA users do not end up paying for more than 50% of the total duct costs for a particular route.⁴⁷⁸ The cap has an effect only on the asset cost component for single bore spine duct.⁴⁷⁹ For lead-in duct, no such cap applies.
- 5.67 For boxes, the regulatory cost base associated with joint boxes is divided by the total number of joint boxes to give a regulatory cost per joint box. The same is done for manholes. The share of this regulatory cost per box that is reflected in the asset cost

⁴⁷⁵ In some cases, Openreach could not provide updated physical network data corresponding to the financial year 2016/17. Where this is the case, we have used the closest data available. We explain this in Annex 25.

⁴⁷⁶ By way of example, assume the regulatory cost base for a particular type of duct is £100m, the average number of 25mm sub-duct equivalents in that type of duct is 2.5 and the total route kilometres of that type of duct is 100,000 km. The asset cost component would be £0.40 per metre. However, if the average number of 25mm sub-duct equivalents in that type of duct is 1.5, the asset cost component would be capped at £0.50 per metre (i.e. 50% x £100m / 100,000 km).

⁴⁷⁷ The average number of 25mm diameter sub-duct equivalents is based on actual usage of space by BT cables and sub-ducts, converted into the equivalent space occupied by 25mm diameter sub-ducts.

⁴⁷⁸ Where the average number of 25mm diameter sub-duct equivalents is less than 2, the resulting cost per metre would be more than 50% of the total duct costs for that route. We understand that Openreach recognised that in 2011 this could be construed as creating an unlevel playing field. We consider that the level of the cap (50%) seems appropriate for the purposes of using the current methodology to set maximum prices for this review period, particularly given the limited expectation that more than one PIA based competitor will enter any single geographical area in this review period, and based on our understanding that in single bore spine duct, a single 25mm sub-duct is generally likely to be sufficient for deploying a rival network. Openreach response dated 7 July 2017 to question 13b of the section 135 notice issued on 16 June 2017.

⁴⁷⁹ The cap only affects single bore spine duct because the average number of 25mm diameter sub-duct equivalents currently occupied in single bore spine duct routes is 1.27 (i.e. less than 2). In all other spine duct routes, the average number of 25mm diameter sub-duct equivalents currently occupied is significantly greater than 2 (4.52 for 2 bore duct, and 10.16 for 3+ bore duct). For these other types of duct, the current methodology will result in allocating less than 50% of the regulatory cost base to PIA rental charges. These figures are derived using modelling assumptions based on the existing PIA model sub-duct equivalent methodology, as set out in Openreach response to question 12c of the 2nd WLA s.135 notice issued on 21 December 2017 and Openreach response to question 13c of the WLA s.135 notice issued on 16 June 2017.

component for the different box-related PIA rental products is then determined as follows:⁴⁸⁰

- For box entry and exit, the regulatory cost per box is divided by the expected number of entries/exits per box (based on an assumption about average usage of boxes under PIA).
- For cable-coils and in-line splices, the asset cost component is based on assumptions about the proportion of space in the box used, and in the case of joint boxes, the types of joint box that can host cable coils.

Allocation of duct costs based on current duct occupancy

5.68 TalkTalk argued that the allocation of duct costs based on the current duct occupancy does not reflect additional sub-ducts installed by PIA users. TalkTalk argued that the impact of this is that BT pays less per sub-duct than telecoms providers using PIA, which prevents a level playing field. TalkTalk suggested that an uplifted level of duct occupancy should be used instead, reflecting one additional sub-duct equivalent due to PIA usage.⁴⁸¹

5.69 We recognise that basing the calculation on current duct occupancy does not take into account any changes in duct occupancy over the review period. However, the likely extent of new network deployment over the next review period is unlikely to have a material impact on average duct occupancy figures which are calculated across the entire Openreach network as a whole.⁴⁸² Moreover, any plausible increase in duct occupancy of single bore duct will not affect rental charges as the cap on the asset cost component is binding. We also note that duct occupancy appears to have fallen in multi-bore duct routes since 2011.⁴⁸³

Allocation of lead-in costs based on duct occupancy of single bore duct

5.70 Under the current methodology, the steps for determining the share of the regulatory cost base that is reflected in spine duct rental charges also apply to lead-in duct, with the exception of the 50% cap. Specifically:

- The regulatory cost base for lead-in duct is divided by the national average number of 25mm diameter sub-duct equivalents in single bore duct.
- The resulting portion of the regulatory cost base is then divided by the total route metres of lead-in duct, to give a cost per metre.

5.71 However, as we explain more fully below, we now consider the first step to be inappropriate on the basis that it relies on a duct occupancy figure which is unlikely to be a good proxy for lead-in duct. We have therefore decided to remove this step in the calculation, noting that this results in an approach which is analogous to the way the asset

⁴⁸⁰ The regulatory cost base per box is adjusted downwards to mitigate the risk of over-recovery, given charges for box entry and charges for cable coils and splice hosting could apply simultaneously.

⁴⁸¹ TalkTalk response to the August 2017 DPA Consultation, paragraphs 2.4 to 2.6.

⁴⁸² We recognise that there are alternative approaches, rather than basing rental charges on national average usage of the infrastructure. However, we do not consider the current approach to be inappropriate.

⁴⁸³ Openreach response to question 12b of the 2nd WLA s.135 notice issued on 21 December 2017.

cost component is calculated for single-premise pole attachments (i.e. the overhead equivalent of underground lead-in duct).

- 5.72 Although the logic of this step intends to reflect the amount of space in lead-in duct used by the telecoms provider relative to BT, the underlying duct occupancy figure used in this step is mostly based on data for spine duct, and only to a minimal extent on data for lead-in duct. The duct occupancy figure for single-bore duct is 1.27 25mm sub-duct equivalents.⁴⁸⁴ Given that (i) lead-in cables are likely to be much smaller than 25mm in diameter; (ii) BT will typically have one lead-in cable serving each premises; and (iii) a single piece of lead-in duct typically serves one premises, the occupancy figure of single-bore duct is unlikely to be a good proxy for the number of 25mm sub duct equivalents in lead-in duct.⁴⁸⁵
- 5.73 A better approach under BT's current methodology would be to apply an occupancy figure derived for lead-in duct only (i.e. not including spine duct). However, given occupancy data for lead-in duct is not separately available, allocating the cost of lead-in duct to PIA rental charges based on actual duct occupancy data is not currently practicable. Nevertheless, given the points (i)-(iii) above, we consider that the average lead-in duct occupancy in terms of the number of 25mm sub-duct equivalents would most likely be below 1, resulting in 100% of the cost base per metre of lead-in duct being allocated to PIA rental charges.⁴⁸⁶ We note that allocating 100% of the cost of lead-in duct to PIA rental charges is analogous to the approach to setting rental charges for single premises pole attachments, which are based on spreading the regulatory cost base equally across all current Openreach attachments. As each current Openreach attachment connects a single end-customer and no uplift is added for PIA attachments, this results in allocating 100% of the regulatory cost base to PIA rental charges.
- 5.74 Given that an occupancy-based allocation of lead-in duct costs, as envisaged by BT's current methodology, is not currently practicable, we consider that an approach analogous to the single-premise pole attachments (allocating 100% of the regulatory cost of lead-in duct to PIA rental charges) is a reasonable way of setting PIA rental charges in this review period.

Assumptions underpinning allocation of box-related costs

- 5.75 The regulatory cost base associated with joint boxes is divided by the total number of joint boxes to give a regulatory cost per joint box. The same is done for manholes. The share of this regulatory cost per box that is reflected in the asset cost component for the different box-related PIA rental products is then determined as follows:⁴⁸⁷

⁴⁸⁴ Openreach response to question 12b of the 2nd WLA s.135 notice issued on 21 December 2017.

⁴⁸⁵ Although some lead-in ducts serve two premises, there is no reason to believe that the figure represents a good proxy for the average number of cables per lead-in duct.

⁴⁸⁶ Although not explicitly stated in the current methodology, we believe that PIA rental charges should not pick up more than 100% of the regulatory cost base for any given asset type.

⁴⁸⁷ The regulatory cost base per box is adjusted downwards to mitigate the risk of over-recovery, given charges for box entry and charges for cable coils and splice hosting could apply simultaneously.

- For box entry and exit, the regulatory cost per box is divided by the expected number of entries/exits per box (based on an assumption about average usage of boxes under PIA).
 - For cable-coils and in-line splices, the asset cost component is based on assumptions about the proportion of space in the box used, and in the case of joint boxes, the types of joint box that can host cable coils.
- 5.76 The steps in the calculation of the asset cost component for box-related rental charges are underpinned by a number of assumptions, which are set out in detail in Annex 5. Prior to the August 2017 DPA Consultation, we asked Openreach to explain the basis of these assumptions. Openreach told us that these were working assumptions at the time of the original calculation six years ago, but was unable to locate the evidence that was used to determine or support these assumptions.
- 5.77 CityFibre argued that Ofcom's lack of understanding of, or disagreement with, aspects of the current methodology will influence telecoms providers' decisions on whether to use PIA in the short-term. CityFibre considered that it signals the probability of potentially significant changes to products and prices in the next market review.
- 5.78 TalkTalk argued that Openreach's inability to share the evidence for the assumptions that underpin the calculations for the asset cost component for the different box-related PIA rental products, or the differentiation between pole related products, is unsatisfactory in light of BT's obligation to evidence and justify its charges to Ofcom.⁴⁸⁸
- 5.79 Following our August 2017 DPA Consultation, we asked Openreach to provide us with current data or information to assess the validity of its working assumptions. On the basis of the data and information received, and in the absence of any superior assumptions suggested by stakeholders, we consider BT's working assumptions to be a reasonable basis for calculating PIA rental charges in this review period. The data and information provided by Openreach with respect to particular assumptions is detailed in Annex 25.
- The maximum charges apply to cables and sub-duct up to 25mm diameter
- 5.80 The current methodology is designed to derive a rental charge that applies to cables or sub-duct of up to 25mm diameter – both in respect of duct rental charges and box entry and exit charges. Some respondents argued that telecoms providers should be allowed to install cables or sub-duct of smaller diameter than 25mm, with lower associated charges, to encourage more efficient use of space.⁴⁸⁹
- 5.81 We asked Openreach why 25mm was chosen as the minimum unit of occupancy. Openreach explained that this reflected the anticipated engineering and deployment practices of the prospective PIA users at the time.⁴⁹⁰ Openreach also explained that the use

⁴⁸⁸ TalkTalk response to the August 2017 DPA Consultation, paragraph 2.3.

⁴⁸⁹ See, for example, responses from Call Flow, GTC and Hyperoptic to 2016 PIA Consultation.

⁴⁹⁰ Openreach explained that 25mm was considered to be a reasonable space to enable network deployment with room for growth and/or an ability for a telecoms provider to manage its own cabling capacity. A 25mm diameter was also strongly linked to network engineering installation and maintenance practices as standard equipment for activities such as

of the 25mm unit charging basis provided some protection against the setting of an unsustainable PIA rental charge. In particular, setting a reduced charge for smaller sub-duct or cables, which perform the same function and have the same substitutional impact as a larger sub-duct, risks leaving Openreach unable to recover its full duct costs without increasing duct access prices in the future.

- 5.82 In our view, the minimum diameter increment chosen by Openreach results in an appropriate share of overall duct costs to be recovered from PIA users (as opposed to Openreach's own downstream services).⁴⁹¹ While we recognise that setting lower prices for smaller cables or sub-duct could provide incentives for more efficient use of the existing space available in Openreach's ducts, this could result in PIA users making a much smaller contribution to duct costs. We do not think this would be appropriate in the short run, and consider that it may prove unsustainable in the long run.⁴⁹² Therefore, we have decided not to depart from the current methodology in this review period and so are setting maximum charges for cables or sub-duct up to 25mm in diameter.

Charges for multiple cables or sub-ducts of less than 25mm

- 5.83 Our approach does not prevent telecoms providers from installing smaller cables or sub-ducts, but Openreach can charge up to the maximum charge for these, as is currently the case. However, we have considered whether the way Openreach currently applies rental charges, to multiple cables (or sub-ducts) in the same duct, or for entering / exiting a joint box or manhole, is inappropriate.
- 5.84 Currently, telecoms providers are charged for each cable or sub-duct up to 25mm. If a telecoms provider deploys a 25mm sub-duct and fills that sub-duct with multiple cables, it will only incur a single rental charge in respect of the 25mm sub-duct. However, if a telecoms provider installs multiple cables without housing them in a sub-duct, each installation would attract its own separate charge, even if the total cross-sectional area is the same as that taken by a 25mm diameter sub-duct. This can result in significantly higher rental charges being payable. For example, rental charges payable for duct could exceed the total regulatory cost per metre.
- 5.85 We recognise that the current approach has advantages in terms of encouraging telecoms providers to house cables in sub-duct. However, in some circumstances, this is not possible. One such case relates to lead-ins, where multiple cables run between the

'rodding and roping' was (and still is) designed to operate within a 25mm diameter space to test, clear and pull cables through duct. Openreach response to question 39 of the WLA s.135 notice issued on 6 March 2017.

⁴⁹¹ The current methodology results in 22% of the regulatory cost base of 2 bore spine duct being allocated to rental charges for this type of duct. The corresponding figure for 3+ bore spine duct is 10%. The operation of the cap means that 50% of the regulatory cost base for single bore spine duct is allocated to rental charges for this type of duct.

⁴⁹² Openreach's own network is currently based on a mix of copper and fibre whereas a rival telecoms provider could deploy a new fibre network using less duct space than Openreach. Therefore, a rival telecoms provider deploying network in a particular area could cover the same customer base as Openreach, but make a smaller contribution to the costs of the shared physical infrastructure. We recognise that this could change in the future as Openreach recovers copper from its physical infrastructure. In Annex 22 we explain that we consider it is likely that the E-side copper will be fully extracted by 2030.

distribution point and each of the customer premises. As these cables run to different end-points, it is not possible to house these cables in a single sub-duct.⁴⁹³ Another case relates to congested duct, where there may not be sufficient space for a sub-duct, but there may be space to nestle multiple smaller cables.

- 5.86 In our view, where multiple cables or sub-ducts are installed in Openreach's ducts, joint boxes or manholes, and they occupy the same or less space as a 25mm diameter sub-duct, they should not attract rental charges in aggregate which exceed the maximum charge for a 25mm diameter sub-duct. If they occupy more space than a 25mm diameter sub-duct, the applicable charge should be for the equivalent number of 25mm diameter sub-ducts.⁴⁹⁴ We expect Openreach to work with industry to determine how this is implemented in practice, as part of the industry discussions chaired by the OTA2.⁴⁹⁵ If those discussions prove to be unsuccessful, we retain our Direction making powers to intervene.

Share of the regulatory cost base to include in pole-related products

- 5.87 The regulatory cost base for poles is divided by the total number of poles to give a regulatory cost per pole. The share of this regulatory cost per pole that is reflected in the asset cost component for the different pole-related rental products is then determined as follows:
- This regulatory cost per pole is first allocated between cable attachments, manifold attachments (i.e. equipment at the top of the pole) and cable up a pole attachments (i.e. cables that run up the pole).
 - For cable attachments, the asset cost component is equal to the relevant part of the regulatory cost per pole, divided by the average number of cable attachments per pole expected under PIA. This is done separately for single-end-user attachments (i.e. dropwires) and multi-end-user attachments (i.e. aerial cables) to reflect the significant difference in the number of attachments on poles which carry dropwires, and poles which carry aerial cables.⁴⁹⁶
 - For manifold attachments and cable up a pole attachments, the asset cost component is equal to the relevant part of the regulatory cost base, divided by the average number of manifold attachments or cable up a pole attachments expected under PIA.
- 5.88 Openreach explained that the basis for charging separately for different pole attachments is to incentivise more efficient use of the pole asset by telecoms providers.⁴⁹⁷ The specific

⁴⁹³ Telecoms providers may also have to put their distribution point equipment further from the premises, given space constraints in existing chambers. This potentially extends the distance over which the telecoms provider needs to run separate cables.

⁴⁹⁴ This is also consistent with the way in which the current duct occupancy figures used in the calculation of the asset cost component have been calculated.

⁴⁹⁵ We explain in Section 6 that we consider that the practical arrangements relating to our decisions for the PIA remedy would benefit from industry discussions chaired by the OTA2.

⁴⁹⁶ On average, carrier poles have fewer cable attachments than distribution poles and the function of those attachments differs (aerial cables support multiple premises whereas dropwires typically support a single premises).

⁴⁹⁷ In particular, if a telecoms provider wishes to connect several premises to a pole, it will be incentivised to use pole top equipment to aggregate incoming cables as it is less costly than running separate cables down the pole.

proportions of cost attributed to each type of attachment are based on assumptions made at the time of the original calculation six years ago. Although Openreach was unable to locate the underlying rationale for these assumptions, they do not appear to be inappropriate in terms of the resulting incentives.⁴⁹⁸

- 5.89 The current methodology is underpinned by assumptions about the number of relevant attachments expected under PIA, which are set out in detail in Annex 5. We do not consider these assumptions to be inappropriate, particularly in light of the high degree of uncertainty around take-up of PIA in the future.⁴⁹⁹
- 5.90 Specifically, with respect to the expected number of single premises attachments (i.e. dropwires), the current methodology assumes that another telecoms provider's attachments are fully substitutional for Openreach's existing attachments.

Calculation of the network adjustment costs component

- 5.91 As explained in Section 4, we have decided that the costs of network adjustments should be recovered across all SMP products that use the physical infrastructure, subject to a financial limit. We explain that we include an allowance for a proportion of the costs of making network adjustments (appropriately capitalised) in the calculation of PIA rental charges.
- 5.92 To implement this, we have applied an uplift to the regulatory cost base to reflect the network adjustment costs that need to be recovered from all users of the infrastructure over the review period. The methodology for calculating the asset cost component (described above) then also applies to these additional costs, such that a proportion of these costs is included in PIA rental charges.
- 5.93 We have modelled the network adjustment costs that need to be recovered from all users of the infrastructure over the review period in the following way:
- a) In Annex 26, we estimate the amount of network adjustment costs that should be recovered across all SMP products that use the physical infrastructure to be £67.74 per premises passed. This is based on our estimate of the average network adjustment costs per premises passed, including network adjustments related to creating capacity for overhead lead-ins.⁵⁰⁰

⁴⁹⁸ The proportion of cost attributed to each type of attachment (in particular, the relative proportions allocated to cable up a pole attachments and manifold attachments) determines the point at which it becomes cheaper to use pole top equipment to aggregate incoming cables. Under the current assumptions, if a telecoms provider is to attach three or more dropwires to a pole, it is cheaper to use pole top equipment to aggregate incoming cables than to run separate cables down the pole.

⁴⁹⁹ We note that Openreach considered that certain assumptions were conservative (i.e. leading to lower rental charges) on the basis that actual attachments under PIA have been much lower than expected. In our view, the underlying assumptions do not seem implausible on a forward-looking basis.

⁵⁰⁰ To estimate the costs that we expect Openreach will actually need to recover over this review period, we use an estimate of the expected (i.e. average) network adjustment costs, rather than the level of the financial limit.

- b) To estimate the total network adjustment costs incurred by Openreach over this review period, we multiply the per premises passed figure by an estimate of the number of premises passed by new networks built using Openreach's physical infrastructure (by other telecoms providers or Openreach itself)⁵⁰¹ in 2019/20 and 2020/21.⁵⁰² In total, we estimate that approximately [X] premises will be passed by networks built using Openreach's physical infrastructure in 2019/20 and 2020/21, giving a total cost incurred by Openreach of £[X].⁵⁰³
- c) We consider most of these costs to be duct related capital costs and so base our calculations on spreading the total amount over an asset life of 40 years.⁵⁰⁴ Furthermore, we have included a return on capital, assuming the same WACC as in the asset cost component calculation (7.9%). This gives a total cost of around £[X] to be recovered from users of the infrastructure over the review period; of which around £[X] is to be recovered in 2019/20 and around £[X] in 2020/21.
- 5.94 As explained in paragraph 5.60 above, we have decided to calculate maximum PIA rental charges for this review period based on a snapshot of costs in a single year. To allow for this, we must also include a single figure for average network adjustment costs in the calculation of PIA rental charges, to apply over the three-year review period.
- 5.95 We do not expect total network adjustment costs to be constant in each year over this review period since these are forecast to increase. We have therefore spread the total network adjustment costs over the three-year period to arrive at a single annual figure. In doing so, we have taken into account the fact that PIA rental volumes are also expected to increase over the review period and, therefore, the amount of network adjustment costs that Openreach will recover through PIA rental charges is expected to increase in each year.
- 5.96 The resulting figure is such that the total network adjustment costs expected to be recovered from PIA rental charges are equal to those if the network adjustment cost

⁵⁰¹ The cost of network adjustments (within the financial limit) related to Openreach's own network deployment will also need to be recovered across all users of the physical infrastructure.

⁵⁰² As explained in Section 7, our decision in relation to the recovery of network adjustment costs does not come into effect until 1 April 2019.

⁵⁰³ Based on forecasts provided by telecoms providers, we estimate that approximately [X] premises will be passed by other telecoms providers using a mixture of PIA-based and end-to-end build (the annual figures for the three years of this review period are approximately [X], [X] and [X]). These estimates are consistent with the numbers of premises ready for service in the WLA charge control, although their timing differs due to the delay between when premises are passed and when they are ready for service. To estimate the total network adjustment costs associated with these deployments, we estimate the equivalent number of premises passed using 100% PIA. We do this by multiplying the number of premises passed in each year by the expected proportion of the deployment that will use PIA. For Openreach, we use Openreach's forecast of the number of premises it will pass with FTTP in areas where Openreach already has an existing copper-based connection. We exclude build in areas where Openreach has no existing physical infrastructure as network adjustments are not relevant. [X]. Openreach response to question 3 of the WLA s.135 notice issued on 18 December 2017.

⁵⁰⁴ This is consistent with the approach taken in the WLA charge control.

component were updated on an annual basis. Based on the above, we calculate an annual figure of around £7m to be recovered from all users of the physical infrastructure.⁵⁰⁵

- 5.97 We split this amount between the regulatory cost base of all duct (comprising lead-ins, spine duct, joint boxes and manholes) and poles, in line with the proportion of network adjustment costs related to duct (including chambers) and poles.⁵⁰⁶ Ultimately, this means allocating around 25% of the £7m to poles (equivalent to an uplift of around 0% to 5% [\mathbb{X}] to the regulatory cost base) and around 75% of the £7m to all duct (equivalent to an uplift of around 0% to 5% [\mathbb{X}] to the regulatory cost base).⁵⁰⁷
- 5.98 The proportion of network adjustment costs included in PIA rental charges then follows the proportion of the regulatory cost base which is included in the asset cost component, as described above. The remainder of the network adjustment costs are expected to be recovered in the WLA charge control.⁵⁰⁸
- 5.99 In its consultation response, Vodafone stated that Ofcom’s assumptions about the number of premises passed and the amount of network adjustment costs are subject to a wide range of actual outcomes. It considered that these should at least be closely monitored and reported in the regulated accounts.⁵⁰⁹ We explain how we will be monitoring actual outcomes in Annex 8, ‘Regulatory Reporting’.
- 5.100 TalkTalk argued that given the high degree of uncertainty about network adjustment costs, it might be prudent to either wait until the following charge control period to recover the actual network adjustment costs (in that period), or recover the forecast network adjustment costs in this review period, but reconcile these with the actual costs in the next review period.⁵¹⁰ At this stage, we consider both these approaches to be inconsistent with general approach to price regulation. Elsewhere in its response, TalkTalk considered that accounting for cost recovery shortfall in future market reviews would be a form of retrospection which we have avoided in the past.⁵¹¹ We note that network adjustment costs have a minimal impact on the regulatory cost base for PIA rental charges (see above), and a small impact on charges set in the WLA charge control (see Section 4).

⁵⁰⁵ This figure is higher than a third of the total figure because most of the volumes and therefore PIA rental revenues are expected to occur in the final year. The over-recovery in the first two years is offset by the under-recovery in the third year.

⁵⁰⁶ Specifically, the costs of relieving congestion on capacity constrained distribution poles account for around £16.66 per premises passed, or around 25% of our estimate of total network adjustment costs (£67.74 per premises passed).

⁵⁰⁷ We recognise that basing the network adjustment cost component on the network adjustment costs likely to be incurred over this review period means that this component can be expected to increase over time as more network adjustments are undertaken. However, we do not consider that there is a risk of encouraging unsustainable entry, and note that our methodology above can be applied to see how this component might increase over time.

⁵⁰⁸ In practice, we include total network adjustment costs (as per paragraph 5.93c) in the WLA charge control. We avoid over-recovery of all PIA related costs by including PIA rental revenues in the WLA charge control. PIA revenues are estimated based on the number of homes passed using PIA (assuming 100% PIA equivalent) and an assumed PIA rental revenue of £10 per home passed per annum.

⁵⁰⁹ Vodafone response to the August 2017 DPA Consultation, page 6.

⁵¹⁰ TalkTalk response to the August 2017 DPA Consultation, paragraph 2.18.

⁵¹¹ TalkTalk response to the April 2017 DPA Consultation, paragraph 3.8.

Calculation of the productisation costs component

- 5.101 We have replaced the existing productisation cost component with our own calculation of an allowance for a proportion of these costs. This reflects our decision that productisation costs should be recovered across all SMP products that use the physical infrastructure (including PIA).
- 5.102 Consistent with our approach to network adjustment costs, we have applied an uplift to the regulatory cost base to reflect the total productisation costs that need to be recovered from all users of the infrastructure over the review period. The methodology for calculating the asset cost component (described above) then applies to these additional costs, such that a proportion of these costs is included in the PIA rental charges.⁵¹² Our approach effectively spreads the productisation costs across all parts of the physical infrastructure, to be recovered from all users of the infrastructure.⁵¹³
- 5.103 We have modelled the productisation costs that need to be recovered from all users of the infrastructure over the review period in the following way:
- **Setting up the PIA product:** We include an estimate for future systems development costs and other costs associated with the Reference Offer of between £3m to £4m ([§<]) to be incurred in the first year of the review period.⁵¹⁴ With respect to costs already incurred, we have sought to include the element of capital costs not yet depreciated, on the basis that Openreach has not yet had a fair opportunity to recover these costs.⁵¹⁵ We estimate these costs to be around £1m to £1.5m ([§<]).⁵¹⁶ Consistent with the WLA charge control, our calculations spread these costs over five years⁵¹⁷, and have included a return on capital. We assume the same WACC as in the asset cost component calculation (7.9%). This gives a total cost of around [§<] to be recovered over this review period.
 - **Managing the PIA product:** In the current methodology, selling, general and administrative (SG&A) costs are assumed to be £0.4m per annum. Openreach provided

⁵¹² The remainder of these costs are then expected to be recovered in the WLA charge control. In practice, we include total productisation costs in the WLA charge control (similar to how existing asset costs are treated) and avoid over-recovery by netting-off PIA revenues in the WLA charge control.

⁵¹³ As a result, rental charges for cable up a pole attachments and manifold attachments now attract productisation costs, whereas previously they did not (on the basis that these products were seen as ancillary to cable attachments). See Openreach response to question 2 of the WLA s.135 notice issued on 27 January 2017.

⁵¹⁴ Openreach response to questions 15 and 18a of the 2nd WLA s.135 notice issued on 21 December 2017.

⁵¹⁵ Excluding them could undermine Openreach's incentives to invest in the PIA product in future. We also note that a large part relates to investment undertaken since Openreach renewed its focus on PIA, resulting in several improvements to its PIA product. See April 2017 DPA Consultation, paragraphs 2.20 to 2.21.

⁵¹⁶ We have included the amount Openreach told us it has already incurred on PIA systems development. We expect that the majority of these costs were incurred from 2016 onwards when Openreach began developing these systems, and are largely undepreciated. We have not included upfront costs Openreach told us it has incurred relating to process and tactical receipt system design, as we expect these were incurred as part of the original PIA remedy in 2010. We expect these costs have been largely or fully depreciated. In addition, these costs were small (less than £[§<]). See Openreach response to question 1 of the WLA s.135 notice issued on 27 January 2017, and Openreach response to question 15 of the 2nd WLA s.135 notice issued on 21 December 2017.

⁵¹⁷ These costs are amortised over five years in BT's accounts. Openreach response to question 16 of the 2nd WLA s.135 notice issued on 21 December 2017.

us with an estimate of SG&A costs in 2016/17-2020/21, showing a flat trend at £[X] per annum over this period.⁵¹⁸ It explained that this number has not been generated from the RFS in the same way as it would for other products, as PIA is not one of the product areas separately identified within the relevant cost allocation model underlying the RFS. As a result, no further overheads have been allocated within this number. However, if these costs were processed within the RFS, some further overheads would be allocated to them.⁵¹⁹ To allow for the additional overheads that would normally be allocated to SG&A costs, we consider that the assumption about the level of SG&A costs used in the current methodology remains appropriate for this review period.

- **Per order processing costs:** We have decided that all order processing costs be recovered through rental charges.⁵²⁰ Currently, only a proportion of order processing costs are recovered through rental charges, with the rest being separately chargeable to the telecoms provider as ancillary charges. Openreach provided an estimate of order processing costs included in PIA rental charges and those separately chargeable as ancillary charges in each year from 2016/17 to 2020/21, which was based on its current operational resource profile and the predicted volume increases and resulting resource impact taken from the systems development business case produced in October 2016.⁵²¹ Openreach's estimate shows manual processing costs increasing substantially in 2018/19 and 2019/20, followed by a decline in 2020/21. The overall trend is consistent with our expectation that as take-up of PIA increases, manual processing costs could increase initially, but systems developments will in due course lead to reductions in manual processing costs. On average, total per order processing costs are expected to be £[X] per annum.

- 5.104 Therefore, the total productisation costs to be recovered over the review period from all users of the physical infrastructure is around £8m, of which around £[X] to be recovered in 2018/19, around £[X] in 2019/20 and around £[X] in 2020/21.
- 5.105 As with the network adjustment cost component, we need to include an annual figure for productisation costs in the calculation of maximum PIA rental charges. We therefore assume a figure of around £3m to be recovered across all users of the physical infrastructure.⁵²²
- 5.106 We split the annual amount of productisation costs between the regulatory cost base of all duct (comprising lead-ins, spine duct, joint boxes and manholes) and poles in proportion to

⁵¹⁸ Openreach response to questions 17b and 18c of the 2nd WLA s.135 notice issued on 21 December 2017.

⁵¹⁹ Openreach response to questions 17b and 18c of the 2nd WLA s.135 notice issued on 21 December 2017.

⁵²⁰ In this section, we identify a set of current ancillary activities that we consider represent productisation costs. We propose that the charges for those activities should be capped at zero and the costs recovered through the PIA rental charge.

⁵²¹ Openreach response to questions 17c and 18d of the WLA s.135 notice issued on 21 December 2017.

⁵²² To be consistent with the approach we have taken to network adjustment costs, we have calculated a figure which generates the same cost recovery compared to if the productisation cost component were updated on an annual basis. However, given most productisation costs are assumed to be relatively stable over the review period, this results in a figure which is very similar to dividing the total cost over the three years by a factor of three.

their regulatory cost base under the asset cost component calculation. Ultimately, this means allocating around 77% of the £3m to duct-related assets and around 23% to pole-related assets (equivalent to an uplift of less than 0.5% to the regulatory cost bases).⁵²³

5.107 As with network adjustment costs, the proportion of productisation costs included in PIA rental charges then follows the proportion of the regulatory cost base which is included in the asset cost component, as described earlier in this section.⁵²⁴

Maximum charges

5.108 The table below shows the current rental charges (as per the Openreach price list) and the maximum charges we have calculated under the methodology set out above. The maximum charges are lower by between 5% and 62%.

Table 5.2: Current PIA rental charges and maximum PIA rental charges (per year)

	Current charge	Maximum charge
Facility in Spine duct per metre - single bore	£0.60	£0.28 (-53%)
Facility in Spine duct per metre - 2 bores	£0.43	£0.18 (-58%)
Facility in Spine duct per metre - 3+ bores	£0.37	£0.14 (-62%)
Facility in Lead-in duct per metre	£0.84	£0.56 (-33%)
Facility on pole for Multi-end-user attachment	£15.48	£11.19 (-28%)
Facility on pole for Single-end-user attachment	£8.85	£4.79 (-46%)
Pole top equipment	£3.72	£3.47 (-7%)
Cable up a pole (per cable)	£2.39	£2.26 (-5%)
Facility hosting (per manhole entry)	£11.18	£8.49 (-24%)
Facility hosting (per joint box entry)	£5.11	£2.04 (-60%)

⁵²³ We recognise that basing the productisation cost component on the productisation costs likely to be incurred over this review period means that this component can be expected to increase over time. However, we do not consider that there is a risk of encouraging unsustainable entry, and note that our methodology above can be applied to see how this component might increase over time as more PIA orders are placed and the product develops further. Moreover, we expect manual processing costs to fall over time due to future systems developments. We also note that the case for pooling and spreading these costs may fall away if Openreach were ultimately to consume the PIA product on the same terms as other telecoms providers.

⁵²⁴ The remainder of the productisation costs are expected to be recovered in the WLA charge control. In practice, we include total productisation costs in the WLA charge control and avoid over-recovery by netting-off PIA revenues in the WLA charge control (as per paragraph 5.104). We avoid over-recovery of all PIA related costs by including PIA rental revenues in the WLA charge control.

	Current charge	Maximum charge
Customer Apparatus In-line Splice hosting and distribution joints (per manhole splice)	£40.06	£29.75 (-26%)
Customer Apparatus In-line Splice hosting and distribution joints (per joint box splice)	£31.42	£18.44 (-41%)
Customer Apparatus Cable Coil Hosting - small (per manhole)	£25.90	£14.88 (-43%)
Customer Apparatus Cable Coil Hosting - medium (per manhole)	£40.06	£29.75 (-26%)
Customer Apparatus Cable Coil Hosting - large (per manhole)	£54.23	£44.63 (-18%)
Customer Apparatus Cable Coil Hosting - small (per joint box)	£18.46	£9.22 (-50%)
Customer Apparatus Cable Coil Hosting - medium (per joint box)	£31.42	£18.44 (-41%)
Customer Apparatus Cable Coil Hosting - large (per joint box)	£44.38	£27.66 (-38%)

Note: Charges shown are per annum (excluding VAT). Rental charges for 'lead-in link' rental products are not shown, as these are equal to the corresponding duct rates. The maximum charges for these products are therefore set equal to the maximum charges for the corresponding duct rates. The maximum charges shown above are applicable from 1 May 2018. In each subsequent year, the maximum charges will be updated for inflation, measured using the Consumer Prices Index (CPI).

5.109 The difference between current PIA rental charges and the maximum charges above reflect a number of changes, which are discussed above. In summary:

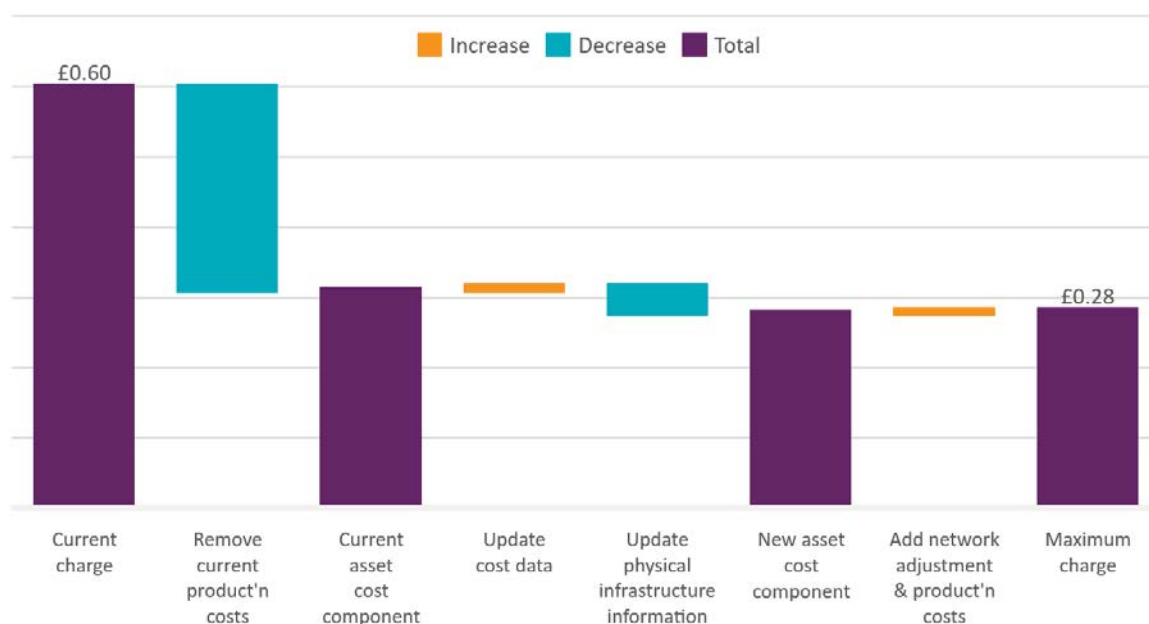
- **updates to cost data:** we have updated the cost inputs used to determine the regulatory cost base, for the financial year 2016/17. In doing so, we have also included indirectly attributed overheads and updated the WACC. Overall, these updates increase the asset cost component of most PIA rental charges, although by differing amounts.
- **updates to physical infrastructure information:** we have updated the physical infrastructure information used to determine the share of the regulatory cost base that should be included in the PIA rental products. These updates increase the asset cost component of some PIA rental charges and reduce the asset cost component of others.
- **allocation of costs per unit of lead-in duct:** we have removed the current duct occupancy-based allocation due to the absence of relevant and reliable data for lead-ins, and have allocated 100% of the cost to PIA users, similar to overhead lead-ins. This

change increases the share of asset costs of lead-in duct allocated to PIA rental charges.

- **productisation costs:** we have replaced the full productisation costs (as features in the calculation of current rental charges) with a proportion of these costs. This results in a significant reduction in most PIA rental charges.⁵²⁵
- **network adjustment costs:** we have included a proportion of network adjustment costs, which increases PIA rental charges by a small amount.

5.110 The following chart illustrates the impact of these changes on rental charges for single bore spine duct.

Figure 5.3: Impact of changes to the current rental charge for single bore spine duct



Source: Ofcom

Duration of lead-in rental charges

5.111 We note that Openreach's current PIA rental charges (including ancillary rentals) are typically subject to a five-year minimum term. Some stakeholders argued that this may be too short a period for many investors and that there is a lack of certainty following an initial term.⁵²⁶ BT is required to publish a Reference Offer that includes details of the duration and renegotiation of the agreements. Our view is that it would be appropriate for Openreach to work with industry to consider the minimum term of PIA rentals (including

⁵²⁵ Productisation costs make up a varying proportion of current PIA rental charges. For duct-related rental products, productisation costs account for between 35% and 80% of the rental charge. For pole-related rental products, they account for between 0% and 35% of rental charges. For box-related rental products, they account for between 12% and 54% of rental charges.

⁵²⁶ Hyperoptic response to the August 2017 DPA Consultation, page 8; Vodafone response to the 2016 PIA Consultation, paragraph 10.

ancillary rentals) as part of the industry discussions chaired by the OTA2.⁵²⁷ If those discussions prove to be unsuccessful, we retain our Direction making powers to intervene.

- 5.112 There is no minimum term for PIA rental charges applicable to lead-ins (i.e. lead-in duct and single-end-user attachments). These rental charges are payable as long as the telecoms provider has a lead-in cable in place. Under this approach, when a customer churns, the rival telecoms provider can either remove their lead-in cable to avoid paying rental charges, or leave it installed on the basis that this enables it to reconnect the customer more easily in future (making it worthwhile to continue paying the rental charges).
- 5.113 In our August 2017 DPA consultation, we recognised that there are various ways of approaching rental charges applicable to lead-ins. We considered that the current approach is appropriate for the purposes of calculating a maximum rental charge for this review period. This was because churn is likely to be limited over this review period, and so the number of lead-ins deployed that do not serve a connected customer will also be limited. As such, we did not propose to depart from this aspect of the current methodology for the purposes of providing certainty for this review period.⁵²⁸
- 5.114 CityFibre and the PAG argued that lead-in rental charges should only apply when the telecoms provider has an active end-customer connection. This is on the basis that requiring telecoms providers to remove lead-ins when a customer churns is inefficient, and does not serve any economic, technical or practical purpose. CityFibre also argued that the fibre lead-in could be left in place and reused by future telecoms providers to whom the end customer moves over time. CityFibre observed that the fibre could effectively become part of the Openreach network, and that it is very likely to be in constant use from the first connection as customers will not wish to go back to copper. CityFibre also said that the current proposition is not attractive because while the actual levels of churn may not be a problem in this review period, telecoms providers will make a decision on whether to use Openreach's infrastructure for lead-ins based on a much longer planning timeframe and there is no guarantee that Ofcom will change this charging practice in the next market review decision.⁵²⁹
- 5.115 We do not believe the current approach carries a significant risk of encouraging inefficient behaviour. This is because we understand that the costs of removing a lead-in when a customer churns and re-installing it when a customer reconnects, are likely to be significantly higher than the rental charges incurred in the period where the connection is

⁵²⁷ We explain in Section 6 that we consider that the practical arrangements relating to our decisions for the PIA remedy would benefit from industry discussions chaired by the OTA2.

⁵²⁸ We considered that determining whether the current approach, and the resulting level of contribution to lead-in costs, would be appropriate over the longer term requires a better understanding of likely usage of lead-ins by rival telecoms providers and the costs of the various actions involved.

⁵²⁹ CityFibre response to the August 2017 DPA Consultation, paragraphs 4.2.7 to 4.2.12; The PAG response to the August 2017 DPA Consultation, paragraphs 70 to 73.

inactive.⁵³⁰ As a result, telecoms providers are unlikely to remove lead-ins when customers churn just to avoid paying rental charges. Moreover, nothing in our approach prevents Openreach and industry reaching agreements to transfer ownership of installed lead-ins.

- 5.116 We also note that charging rental for lead-ins irrespective of the status of the end-customer is consistent with the way in which the level of rental charges is calculated under the current methodology. In particular, the regulatory cost base is spread over the current number of Openreach attachments, which include active as well as inactive end-customers. The alternative, compatible with CityFibre's and the PAG's proposed application of PIA rental charges to active connections only, would be spreading the regulatory cost base over the Openreach attachments that are currently active. This would lead to a higher level of rental charges.⁵³¹
- 5.117 More generally, while we recognise that there are various ways of approaching lead-in rental charges, we do not agree that the practice of charging rental irrespective of the status of the customer connection is necessarily inappropriate, or results in the PIA remedy being unattractive. The application of rental charges reflects the fact that the telecoms provider is occupying space in Openreach's infrastructure (and in this respect is consistent with the approach to other PIA rental charges). It also reflects the fact that the telecoms provider derives a benefit from having a lead-in installed.^{532 533}

Ancillary charges

- 5.118 The current PIA product has a range of associated ancillary activities for which a telecoms provider will face charges where these are performed by Openreach on its behalf. The current regulation requires all ancillary activity charges to be set at a level that is reasonably derived from the costs of provision. This is based on a forward looking long run incremental cost approach, allowing an appropriate mark-up for the recovery of common costs, including an appropriate return on capital employed. This is commonly referred to as a 'basis of charges' requirement.

⁵³⁰ For example, if the cost of removing a lead-in and the cost of re-installing a lead-in each amounted to £50, this is equivalent to paying rental charges for 10m of lead-in duct for about 18 years, and single-end-user attachment rental charges for about 21 years, based on the maximum charges we have calculated.

⁵³¹ We do not agree with CityFibre that the fibre lead-in will be in constant use from the first connection. Networks deployed using Openreach's physical infrastructure face competition from other networks (e.g. Virgin Media's cable network) and not all homes take fixed broadband. Therefore, we expect that there will be premises connected to networks deployed using Openreach's physical infrastructure, but which are not active customers on any of those networks.

⁵³² We expect that a telecoms provider will deploy lead-ins upon acquisition of the customer, at which point it will benefit from the revenue associated with that customer. However, even when it loses a customer, it benefits from having a lead-in connection in place when it comes to competing to reacquire the customer. For example, it can compete for the customer with more certainty over the connection process and can offer instant customer connection with less inconvenience for the customer. It can also re-connect the customer at lower cost than if it had removed the lead-in and needed to re-install it.

⁵³³ Charging rental for lead-ins irrespective of the status of the customer connection avoids the need for telecoms providers to notify Openreach when the status of a customer connection changes. We note that competing telecoms providers may be reluctant to share this information with Openreach notwithstanding the protection offered by the general conditions.

Our proposals

- 5.119 In our April 2017 DPA Consultation, we proposed that BT's network access obligation should include a requirement to provide ancillary services as may be reasonably necessary to enable and support the provision of PIA.
- 5.120 In our August 2017 DPA Consultation, we explained that ancillary activities fall into the following broad categories:
- activities related to network adjustments (e.g. new infrastructure build and enabling works). Currently, telecoms providers face the full upfront costs relating to network adjustments.
 - order processing activities (e.g. providing network records or validating telecoms providers' plans). Currently, the costs relating to PIA order processing activities are recovered from PIA users only.
 - other miscellaneous activities related to using PIA (e.g. survey activities applicable in situations when Openreach is required or is requested to be in attendance during a survey, and accreditation activities). Currently, telecoms providers face the full cost relating to these activities.

Ancillary activities relevant to network adjustments

- 5.121 As a consequence of our proposal that the costs of network adjustments should be recovered across all SMP products that use the infrastructure up to a financial limit, we proposed changes to BT's pricing for related ancillary activities.
- 5.122 We proposed that when calculating whether network adjustments for any order exceed the applicable financial limit, a basis of charges approach should be used to calculate the ancillary activity charges for such network adjustments. As such, where a network adjustment is requested by a telecoms provider, the relevant ancillary activity charge (set on a basis of charges approach) should be used to calculate the aggregate costs of network adjustments associated with the order, and to determine whether the financial limit for the order has been exceeded. Where the financial limit for the order has been exceeded this would give rise to charges above the financial limit being paid directly by the telecoms provider.
- 5.123 The draft legal instruments at Annex 6 of our August 2017 DPA Consultation specified the set of ancillary activities (from Openreach's price list) that were relevant to network adjustments and determining whether the financial limit has been met.

Productisation related activities

- 5.124 Reflecting our proposal that productisation costs relating to PIA should be recovered across all SMP products that use the physical infrastructure, we proposed that the charges for ancillary services that represent productisation activities should be capped at zero as we are allowing for these costs to be recovered elsewhere.

All other ancillary activities

- 5.125 For all other ancillary activities, we proposed that the charges should be set on a basis of charges approach. Specifically, we proposed that charges are derived from the costs of provision based on a forward looking long run incremental cost approach, allowing an appropriate mark-up for the recovery of common costs, including an appropriate return on capital employed.

Stakeholder responses

- 5.126 Openreach agreed that where items are reasonably required for the provision of PIA, a basis of charges obligation is suitable for ancillary items. It argued that where items are optional and not reasonably required, price regulation should not be applied. Openreach noted that it had provided Ofcom with the basis for calculating the current prices and since Ofcom has not proposed price changes it takes this as agreement that the current prices meet the pricing approach.⁵³⁴
- 5.127 Openreach made the following comments on specific ancillary charges:
- a) Openreach agreed that the overhead network data report is a service that should not be required moving forward with the Openreach PIA Digital Map Tool in place. It also agreed that it may be reasonable not to raise the administration charge for joint box break through once the new product and processes have been agreed as part of the new Reference Offer. However, it considered that it was inappropriate to remove any items from the price list in advance of the new Reference Offer.⁵³⁵
 - b) Openreach argued that route plan provision, network records admin and technical validation are all activities that are envisaged to be required in the future. It noted that these will be influenced by the extent of the current system developments, plus the development of a fully automated solution where reservations can be secured via the PIA Digital Map Tool. It argued that there was uncertainty around setting the charge control in the WLA market at the correct level to recover these costs, given discussions on the PIA Reference Offer had yet to begin. Therefore, Openreach considered that it would be appropriate to continue charging for these items until the final Reference Offer is agreed. It considered that at this point the validity and expected volume of these items will be better understood and an alternative pricing mechanism can be agreed if necessary.⁵³⁶
- 5.128 Hyperoptic agreed that a basis of charge approach should be applied to network adjustments that are above the financial limit.⁵³⁷ TalkTalk agreed with the proposed

⁵³⁴ Openreach response to the August 2017 DPA Consultation, page 41.

⁵³⁵ Openreach response to the August 2017 DPA Consultation, page 40.

⁵³⁶ Openreach response to the August 2017 DPA Consultation, page 40.

⁵³⁷ Hyperoptic response to the August 2017 DPA Consultation, page 9.

approach to pricing ancillary activities but expected Ofcom to monitor the charges and impose a price cap should they become material.⁵³⁸

- 5.129 The PAG referred to a benchmarking exercise (carried out by Vodafone) that compared various ancillary charges set by Openreach with comparable charges set in Spain and Portugal. Based on this evidence it suggested that the cost of ancillary activities will continue to make DPA disproportionately more expensive in the UK compared to other countries. However, it also argued that Ofcom should not rely on benchmarking data as a substitute for price regulation, noting the European Commission discouraged a benchmarking approach due to it not allowing for national circumstances that could impact costs. It considered that without access to the underlying Openreach cost data, it is difficult for the PAG to assess whether the higher prices are justified or whether BT is over-recovering its relevant cost base.⁵³⁹ Vodafone suggested that Ofcom should undertake the task of ascertaining whether ancillary charges are set at the appropriate cost oriented level.⁵⁴⁰
- 5.130 CityFibre provided evidence relating to the costs of undertaking network adjustments based on its fibre network deployment in Southend. This was part of a trial by CityFibre to use PIA. Based on its analysis of data collected from its Southend trial, it argued that Openreach's price levels for network adjustments are inflated and are unsuitable for Ofcom to use in its calculations of the PIA rental charges.⁵⁴¹
- 5.131 Flomatik considered that Openreach's ancillary services prices (for congestion relief and network augmentation) were significantly higher than the costs that would be incurred by a telecoms provider undertaking those activities directly. As such, it considered that telecoms providers are likely to opt to undertake this work themselves.⁵⁴²

Our reasoning and decisions

Ancillary activities relevant to network adjustments

- 5.132 As explained in Section 4, we have decided that the cost of network adjustments, up to the financial limit, should be recovered from all products in the market in which BT has SMP and which use BT's physical infrastructure. The costs for network adjustments above the financial limit should be recovered directly from the telecoms provider. As a consequence, we are requiring changes to BT's pricing for related ancillary activities.
- 5.133 We have decided that when calculating whether network adjustments for any order exceed the applicable financial limit, a basis of charges approach is used to calculate the ancillary activity charges for such network adjustments. As such, where a network adjustment is requested by a telecoms provider, the relevant ancillary activity charge (set on a basis of charges approach) is used to calculate the aggregate costs of network

⁵³⁸ TalkTalk response to the August 2017 DPA Consultation, page 10.

⁵³⁹ The PAG response to the August 2017 DPA Consultation, page 24.

⁵⁴⁰ Vodafone response to the August 2017 DPA Consultation, page 10.

⁵⁴¹ CityFibre response to the August 2017 DPA Consultation, pages 26 to 28.

⁵⁴² Flomatik response to the August 2017 DPA Consultation, page 3.

adjustments associated with the order, and to determine whether the financial limit for the order has been exceeded. Where the financial limit for the order has been exceeded, charges above the financial limit would be paid directly by the telecoms provider.

- 5.134 In Section 4, we conclude that the financial limit should be based on the scale of the deployment using PIA, and applied to each order based on the number of kilometres of spine duct ordered. In Annex 26, we conclude that the financial limit should apply in aggregate to all reasonable adjustments that fall within scope, including any lead-ins that are subsequently ordered, which are contiguous to the duct requested in the initial order.
- 5.135 For the reasons set out in Section 4, we have decided that the costs of network adjustments relating to overhead lead-ins should be approached differently, and not be subject to a financial limit. Specifically, the costs of these network adjustments should be recovered from SMP products which use BT's physical infrastructure without limitation. Therefore, the costs associated with the following network adjustments should not be included for the purposes of determining whether the financial limit has been exceeded:
- network adjustments related to the provision of capacity for dropwires; and
 - network adjustments for making poles (used for providing dropwires) useable which are currently not useable because they are damaged, decayed or defective.

Annex to condition 7D part 1 and part 2

- 5.136 The draft legal instruments set out in the August 2017 DPA consultation specified the set of ancillary activities (from Openreach's price list) that are relevant to network adjustments and determining whether the financial limit has been met. These were set out in the annex to draft condition 7D part 1 and part 2.
- 5.137 Openreach made several comments relating to this list of ancillary activities related to network adjustments.⁵⁴³
- 5.138 Openreach disagreed with aborted blockage clearance activities being included in the annex to draft condition 7D part 1 (i.e. being considered as a network adjustment). It argued that it should not be required to fund the aborted requests of other telecoms providers. We understand that these charges relate to where a network adjustment is attempted but is then aborted for unforeseeable reasons. We consider that the costs associated with failed attempts to carry out network adjustments should be treated in the same way as the costs of carrying out network adjustments successfully. This is because we consider these as costs incurred in the provision network adjustments: even though the network adjustment is not completed successfully, this just reflects the fact that civil works are unpredictable to some degree.
- 5.139 Openreach disagreed with the inclusion of customer changeover services in the annex to draft condition 7D part 1, since these services related to changing a dropwire or aerial cable belonging to another telecoms provider. For the same reasons, it disagreed with the inclusion of retention, refix and renewal of aerial cables and dropwires where these

⁵⁴³ Openreach response to the August 2017 DPA Consultation, pages 51 and 52.

belonged to another telecoms provider, and road closures (for cable works) where these related to the costs relevant to other telecoms providers cables. We consider that customer changeover services (retention, refix and renewal of aerial cables and dropwires, and road closures for cable works) should only be considered network adjustments where they are part of BT's requirement to adjust its physical infrastructure.

- 5.140 Openreach disagreed with the inclusion of activities relating to the removal of locked lids being included in the annex to draft condition 7D part 1 in circumstances where it has made a key available to a telecoms provider. We now consider that activities relating to the removal of locked lids should be treated as ancillary services more generally (as opposed to those relating to network adjustments). We consider that Openreach and industry should agree arrangements where, as far as is reasonably possible, keys are made available to other telecoms providers.
- 5.141 Openreach disagreed with the inclusion of a new pole in the annex to draft condition 7D part 1, on the basis that this extended its network footprint and should not be considered as providing additional capacity. As set out in Section 2, Openreach is not required to extend its network footprint as part of making network adjustments relevant to its network access requirement. Notwithstanding this, we consider that on occasion Openreach may need to provide a new pole as part of relieving congestion within its network footprint.
- 5.142 Openreach noted that aborted charges relating to cable recovery and a per hour operative charge had not been included in the annex to draft condition 7D part 1. We have included these charges as we consider that they relate to network adjustments.
- 5.143 The legal instruments at Annex 33 specify the set of ancillary activities (from Openreach's price list) that are relevant to network adjustments and determining whether the financial limit has been met.⁵⁴⁴

Charges for network adjustments carried out by telecoms providers on behalf of BT

- 5.144 We have decided that the PIA Reference Offer should include conditions on which telecoms providers may elect to undertake works on behalf of BT (i.e. a self-provision model) and with the opportunity to seek to recharge Openreach for those works.
- 5.145 As in our August 2017 DPA Consultation, we consider that industry is best placed to agree the details of the mechanism and the applicable costs (or rates) that a telecoms provider can recover for completing the network adjustment. Although a basis of charges approach should be used to determine whether a network adjustment falls within the financial limit, we remain of the view that it may be inappropriate for a telecoms provider to recover costs set at this level for undertaking work on behalf of BT, since the basis of charges approach includes a contribution to BT's common costs.

⁵⁴⁴ Given our assessment and conclusions in Section 2, we no longer consider that 'Joint-Box breakthrough' is an ancillary activity relevant to a network adjustment. Therefore, this service is not included in the Annex to Condition 7D part 1. Our view is that this must be offered as an ancillary service more generally.

Productisation costs

- 5.146 In Section 4, we concluded that productisation costs relating to PIA should be recovered across all SMP products that use the physical infrastructure.
- 5.147 In Table 5.4, we have identified several ancillary activities from Openreach's price list that we consider represent productisation activities since they relate to order processing activities and/or activities undertaken by Openreach for the ongoing support of PIA. This set of ancillary activities are identical to those we identified as being productisation activities in our August 2017 DPA Consultation.

Table 5.4: Productisation related ancillary activities

Ancillary activity	Price (excluding VAT)
Route Plan provision; per hour	£75.00
Network records administration charge; per hour	£75.00
Technical Validation (survey, approval, build); per hour	£75.00
Joint box breakthrough administration charge	£12.00
Overhead network data report for established Physical Infrastructure Access (PIA) telecoms providers	£500

- 5.148 Consistent with our decision on the approach to the recovery of productisation costs, we have decided that the costs of the ancillary activity services identified above should be recovered across all SMP products that use the physical infrastructure. Therefore, we have decided that the charges for these services will be capped at zero as we are allowing for these costs to be recovered elsewhere.⁵⁴⁵
- 5.149 In response to our August 2017 DPA Consultation, Openreach argued that the ancillary activities we identified as productisation activities should not be removed from the Openreach price list until the new PIA Reference Offer was agreed. In Section 7 we provide our conclusions on the implementation timetable for the PIA remedy. In that section, we conclude that the new PIA rental prices (that will include a share of productisation costs) should come into effect within one month of the publication of the Final Statement. We do

⁵⁴⁵ We note that the ancillary activity 'Route Plan provision' charge is relevant to providing telecoms providers using PIA with information about the location of BT's physical infrastructure. Our view is that this is likely to represent a legacy activity relating to manually providing and processing network records that pre-dates the development of the Openreach PIA Digital Map Tool. Therefore, with the exception of Openreach providing information manually relating to sensitive network areas (which is not included in the Openreach PIA Digital Map Tool), we envisage that the manual process will be irrelevant going forwards. Nevertheless, consistent with our proposals for the recovery of productisation costs, to the extent that manual processes remain, we propose that these should be capped at zero. Similarly, we consider that the overhead network data report represents a legacy activity that pre-dates the development of the Openreach PIA Digital Map Tool.

not agree with Openreach that it would be appropriate to delay the introduction of the new PIA rental prices until the PIA Reference Offer is agreed, on the basis that future volumes of PIA will be more certain. In setting the PIA Rental Prices (that include a share of productisation costs) we have included a forecast of PIA volumes that we consider will provide Openreach with a reasonable opportunity to recover costs.

Other ancillary activities and a basis of charges approach

- 5.150 For all other ancillary activities, we have decided that the charges are set on a basis of charges approach. Specifically, charges should be derived from the costs of provision based on a forward looking long run incremental cost approach allowing an appropriate mark-up for the recovery of common costs, including an appropriate return on capital employed.
- 5.151 We consider that this is appropriate to mitigate the risks of BT fixing and maintaining some or all of its prices at an excessively high level, given BT's incentives and abilities arising from our provisional conclusion that BT had SMP in the WLA market.
- 5.152 We recognise that although this limits Openreach's ability to set higher charges to increase its profits, it nevertheless retains a degree of flexibility. Nevertheless, we consider that a basis of charges approach for setting ancillary activity charges is an appropriate and proportionate approach in the context of this market review. This is because we do not expect the ancillary charges actually levied to telecoms providers to account for a material proportion of the total cost of deploying a competing network, as those related to network adjustments (up to the financial limit) and productisation are recovered across all SMP products that use the physical infrastructure. Moreover, many of the other ancillary charges relate to optional activities which the telecoms provider could carry out themselves instead of requesting Openreach to do it.

Compliance with the basis of charges approach

- 5.153 A number of stakeholders queried whether Openreach's ancillary activity charges comply with a basis of charges approach. The PAG cited evidence of the differences between a sample of Openreach ancillary services and those charged in other European countries. A telecoms provider [X] referred to the costs it incurred for network adjustments as part of its own network deployment. Our view is that neither of these provide evidence to either confirm or refute whether Openreach's ancillary prices are cost orientated. In relation to the benchmarking evidence provided by PAG, we consider that the Openreach services do not map closely to those used in the European comparisons.⁵⁴⁶ Moreover, the PAG itself acknowledged the problem in relying on benchmarking comparisons given these do not take account of national circumstances that could impact costs.
- 5.154 In relation to CityFibre's evidence, we note that the information it has provided relates to the costs it incurred in one particular geographic area as opposed to nationally

⁵⁴⁶ We note that one of the services used in the comparison (cited as 'information request') relates to accessing Openreach's records which we have decided is a productisation activity and should be capped at zero in the future; and for a number of the services cited, a comparable price is not given as evidence.

representative costs, as would be the case of the costs used in determining Openreach's prices. In addition, we note that CityFibre did not include a share of its own common costs in its estimate of network adjustment costs when comparing those with Openreach ancillary charges (which include a share of Openreach's common costs) for comparable network adjustments.⁵⁴⁷

- 5.155 Openreach has suggested that since Ofcom has not proposed any changes to the level of its ancillary prices (following the receipt of information relating to the costs of those services), it takes this as agreement that the current prices comply with the basis of charges approach. For the avoidance of doubt, it is for Openreach to ensure that its prices comply with its regulatory requirements, including the basis of charges condition. The approach set out in this statement should not be seen as determining that BT's current pricing approach is in compliance with those obligations.⁵⁴⁸

Legal tests

- 5.156 In this section and Section 4 we have set out our decisions on regulating PIA pricing and cost recovery. In summary, we have decided:
- to impose a maximum cap on duct and pole rental charges using the current methodology;
 - to retain the basis of charges condition for ancillary charges, apart from charges for network adjustments and productisation costs where we considered that Openreach should recover associated costs over all users of its infrastructure, in the case of network adjustments subject to a financial limit.
- 5.157 To give regulatory effect to the decisions set out in Sections 4 and 5 we set two SMP conditions under section 87(9) of the Act: condition 6 (Basis of Charges) and condition 7D (PIA Charge Control). The text of these conditions is set out in Annex 33.
- 5.158 Section 87(1) of the Act provides that, where we have made a determination that a person (here BT) has SMP in an identified services market (here the supply of wholesale local access at a fixed location in the United Kingdom excluding the Hull Area), we shall set such SMP conditions authorised by that section as we consider appropriate to apply to that dominant provider in respect of the relevant network or relevant facilities and apply those conditions to that person.

⁵⁴⁷ CityFibre response to the August 2017 DPA Consultation, page 26 to 28.

⁵⁴⁸ We noted in our August 2017 DPA Consultation that the current price for several network adjustments services under PIA are higher than those charged for comparable network adjustments as part of Excess Construction Charges (ECCs) related to leased lines. Openreach explained that the difference between the prices is driven by additional costs incurred in relation to PIA that are not incurred for its other services. More specifically, Openreach explained that that PIA prices have been calculated on the same basis as ECCs, but include an additional 10% mark-up for additional overheads related to the management of the PIA telecoms provider (as an additional third party). Openreach response to question 6c of the 1st WLA s.135 notice issued on 30 November 2017.

- 5.159 Section 87(9) of the Act authorises the setting of SMP services conditions to impose on the dominant provider:
- such price controls as Ofcom may direct in relation to matters connected with the provision of network access to the relevant network, or with the availability of the relevant facilities;
 - such rules as Ofcom may make in relation to those matters about the recovery of costs and cost orientation;
 - such rules as they may make for those purposes about the use of cost accounting systems; and
 - obligations to adjust prices in accordance with such directions given by Ofcom as they may consider appropriate.
- 5.160 Both the basis of charges condition and the PIA charge control condition fall within the scope of section 87(9).
- 5.161 Before setting conditions falling within section 87(9) we are required to:
- ensure that the condition satisfies the tests set out in section 88 of the Act (as the basis of charges condition and PIA charge control equate to a condition about network access pricing); and
 - be satisfied that the condition satisfies the test set out in section 47(2) that the condition is objectively justifiable, not unduly discriminatory, proportionate and transparent.

Section 88 tests

- 5.162 Section 88 of the Act states that Ofcom should not set an SMP condition falling within section 87(9), 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:
- promoting efficiency;
 - promoting sustainable competition; and
 - conferring the greatest possible benefits on the end-users of public electronic communications services.
- 5.163 Under section 88(2) of the Act, when setting an SMP condition falling within section 87(9), we must take account of the extent of the investment in the matters to which the condition relates of BT.
- 5.164 In our opinion, the conditions 6 and 7D satisfy section 88 of the Act.
- 5.165 For the reasons set out below, we consider that the conditions satisfy the requirements of section 88(1).
- 5.166 For the reasons set out in Sections 4 and 5, it appears to us from our market analysis that there is a relevant risk of adverse effects arising from price distortion in that BT might fix or maintain its prices at an excessively high level so as to have adverse consequences for end-users of public electronic communications services. Specifically, given our conclusion that

BT has SMP in the WLA market, it is likely that BT would have the incentive and ability to set excessively high prices for PIA. This could undermine the case for investment by competing telecoms providers, undermining the effectiveness of the obligation to provide PIA, and could also result in higher retail prices; all of which is ultimately against the interests of consumers.

- 5.167 In relation to the conditions we are setting, overall we consider that our objective to encourage other telecoms providers to invest in their own networks in order to promote competition is consistent with our obligations under section 88. In general, our view is that our approach to rental charges and charges for ancillary services will promote sustainable competition, which we consider is likely to be the most effective way of benefiting end-users of public electronic communications services. This will bring significant benefits to consumers in the longer term from innovation (including innovation to increase efficiency and lower costs), choice, stronger incentives to price keenly to attract consumers and higher quality of services.

Basis of charges

- 5.168 Condition 6.4 requires BT to ensure that its charges for PIA services are reasonably derived from the costs of provision based on a forward looking long run incremental cost approach, allowing an appropriate mark up for the recovery of common costs, including an appropriate return on capital employed. We consider that this requirement promotes efficiency and sustainable competition and provides the greatest possible benefits to end-users by enabling competing providers to buy network access at levels that might be expected in a competitive market.
- 5.169 The extent of investment of the dominant operator has been taken into account as the approach provides for an appropriate return on the capital employed to be included in the charges.

Rental charges

- 5.170 Conditions 7D.1 and 7D.2 require BT to ensure that its charges for the current set of PIA rental products do not exceed the maximum charges we have calculated.
- 5.171 Capping PIA rental charges will promote sustainable competition because it provides potential investors with increased certainty as to the level of rental charges they would face, as it removes the risk of changes to the methodology currently adopted to calculate rental charges, which could have potentially significant impacts on those charges. Providing investors with greater certainty that the level of PIA rental charges will not be excessive facilitates the building of credible business cases for deploying a network using PIA. We consider this is necessary in order to realise the significant benefits resulting from other telecoms providers deploying ultrafast networks at scale. Encouraging such entry and expansion provides the greatest possible benefits to end-users.

- 5.172 The form of control also encourages Openreach to increase its productive efficiency, as it allows Openreach to keep any profits it earns within the defined period by reducing its costs compared to those envisaged in setting the control.
- 5.173 As explained in this section, there are also a number of aspects of the approach we have adopted which promote efficient use of the existing space in Openreach's physical infrastructure.
- 5.174 The extent of investment of the dominant operator has been taken into account as our approach provides for an appropriate return on the capital employed to be included in the charges.

Charges for ancillary activities related to productisation

- 5.175 Condition 7D.3 requires BT not to charge separately for ancillary services related to order processing. This gives effect to our decision that productisation costs should be pooled and recovered from all users of the physical infrastructure.
- 5.176 In the absence of this requirement, Openreach could seek to recover these costs from PIA users alone (either through rental charges or ancillary charges). Any resulting disparity in costs faced by Openreach and the costs faced by other telecoms providers in respect of using the physical infrastructure has the potential to undermine confidence in the effectiveness of the PIA remedy as a basis on which to build competing networks at scale. Pooling these costs and spreading them across all SMP products that use the physical infrastructure will eliminate the differential, thereby ensuring a level playing field and promoting network competition. Again, encouraging such investment provides the greatest possible benefits to end-users.
- 5.177 As set out in Section 4, we have considered whether our approach to the recovery of productisation costs promotes inefficient investment. However, we do not consider this to be a significant risk. Moreover, with respect to systems developments, Openreach retains a significant degree of control over costs as it decides how the systems development is undertaken.
- 5.178 The extent of investment of the dominant operator has been taken into account as the PIA rental charge calculation, and our approach in the WLA charge control, provide for Openreach to recover the relevant costs. Also, our approach provides for an appropriate return on the capital employed to be included in the charges.

Charges for network adjustments

- 5.179 Conditions 7D.4, 7D.5 and 7D.6 require BT not to charge separately for network adjustments falling within the financial limit we have calculated. These conditions give effect to our decision that the costs of network adjustments should be recovered over all SMP products that use the physical infrastructure, subject to a financial limit.
- 5.180 For the reasons explained in Section 4, the current approach of charging telecoms providers the full upfront cost of network adjustments is likely to render the remedy ineffective as a basis for promoting the deployment of competing networks at scale.

Recovering these costs from all users of the physical infrastructure promotes sustainable competition by reducing barriers to investment in competing networks, including ensuring a level playing field with respect to the recovery of these costs. As above, encouraging such investment provides the greatest possible benefits to end-users.

- 5.181 In Section 4, we recognise that under our approach, competing telecoms providers do not face the full incremental cost of deploying a network using Openreach's physical infrastructure. We acknowledge the possibility that this may result in competing network build occurring in circumstances where the build would not be profitable if access seekers had been charged for the network adjustments. However, we anticipate significant dynamic benefits to consumers where actual network competition emerges. These dynamic benefits mean even if our approach does result in some investment which would not have occurred if access seekers had been charged for the network adjustments, that does not mean our approach is inappropriate.
- 5.182 Moreover, we consider that the limit on the amount Openreach has to recover in this way mitigates the risk that the cost of network adjustments is higher than we anticipate, and therefore mitigates the risk that the costs of new entry outweigh the gains.
- 5.183 As discussed in Section 4 the extent of investment of the dominant operator has been taken into account as the PIA rental charge calculation, and our approach in the WLA charge control, provide for Openreach to recover the relevant costs. Also, our approach provides for an appropriate return on the capital employed to be included in the charges. The limit on the amount of network adjustment costs which Openreach has to recover in this way also mitigates the risk that the cost of network adjustments is higher than we allow for in the PIA rental charge calculation and in the WLA charge control.

Section 47(2) tests

- 5.184 In addition to the requirements in sections 87(9) and 88 discussed above, Ofcom must be satisfied that any SMP Condition satisfies the test in section 47(2) of the Act which requires conditions to be objectively justifiable, non-discriminatory, proportionate and transparent.

Objectively justifiable

- 5.185 As set out above we consider that the conditions are objectively justifiable because, given our conclusion that BT has SMP in the WLA market, the conditions are required to ensure that retail competition is not distorted by BT using its SMP to set excessively high prices for PIA (in respect of rental products and charges for ancillary services). In the absence of any control, BT would be able to set charges unilaterally and above the competitive level. In addition, Openreach's freedom to revise the methodology it currently adopts to calculate rental charges does not provide potential investors with sufficient certainty as to the level of rental charges they would face. The risk of high prices and the current lack of certainty could undermine the case for investment by competing telecoms providers, all of which is ultimately against the interests of consumers.

Undue discrimination

- 5.186 We consider that the conditions do not discriminate unduly against BT as it is the only telecoms provider to hold SMP in the WLA market (for the UK excluding the Hull Area) and the controls seek to address that market position, including BT's ability and incentive to set excessive charges for services falling within the controls.

Proportionality

- 5.187 We set out our reasons for imposing conditions 6 and 7D in this section and Section 4. We are satisfied the conditions are proportionate because the conditions we have set go no further than is necessary to ensure that there are reasonable charges, and sufficient certainty concerning charges, for PIA services which we consider are critical to the development of a competitive market.
- 5.188 As set out in this section we have imposed a cap on rental charges. We consider that this decision addresses our identified competition concerns while going no further than is necessary, having regard to our objective to provide conditions that guard against the risk of excessive prices and support investors' ability to build a viable business case for network deployment using PIA.
- 5.189 As set out, we have decided on a basis of charges approach to ancillary charges. We have decided that productisation costs relating to PIA should be recovered across all SMP products that use the physical infrastructure and that ancillary charges that relate to necessary network adjustments should be subject to a financial limit. We consider that these decisions address our identified competition concerns while going no further than is necessary.
- 5.190 The basis of charges obligation addresses the risk of excessive prices while setting out that charges should be reasonably derived from the costs of provision based on a forward looking long run incremental cost approach. This allows for an appropriate mark up for the recovery of a fair and reasonable share of common costs including an appropriate return on capital employed, which might include a 'risk premium' where appropriate.
- 5.191 As set out in Section 4 we have further decided to set an obligation requiring that the costs of adjustments to physical infrastructure, where these are necessary for that infrastructure to be available to telecoms providers to deploy their own networks, be recovered from all products in the market in which BT has SMP and which use Openreach's physical infrastructure (including PIA). This is necessary to reduce the barriers to competitive network investment at scale and ensure a level playing field with the charges Openreach faces itself for using its own ducts and poles. To limit the potential impact of this approach on Openreach, we have set a financial limit on the network adjustment costs that Openreach should be required to recover across all SMP products.

Transparency

- 5.192 We consider that the charge controls we are imposing are transparent in relation to what they are intended to achieve. The aims and effects of the basis of charges condition and

charge control are clear, and they have been drafted so as to secure maximum transparency. We have consulted fully on the basis of charges condition and charge control. Our reasoning is set out in the August 2017 DPA Consultation and this volume.

- 5.193 The text of the conditions has been published in Annex 33 and the operation of those conditions is aided by our explanations in this volume.

Ofcom's duties under section 3 and 4 of the Act

- 5.194 When setting SMP conditions we are also required to carry out our functions in accordance with our duties under sections 3 and 4 of the Act. We consider that the conditions are consistent with our duties under sections 3 and 4 of the Act.
- 5.195 For the reasons set out above, we consider that the obligations set out in this statement will, in particular, further the interests of citizens and of consumers in the relevant market by the promotion of competition in line with section 3 of the Act. In particular, the charge control seeks to ensure the availability of physical infrastructure to promote the deployment of competing electronic communications services. In setting the charge control, we have had regard to the desirability of promoting competition in the relevant market, the desirability of encouraging investment and innovation in the relevant market, including by third-party telecoms providers, and the desirability of encouraging the availability and use of high speed data transfer services throughout the UK.
- 5.196 Further, we consider that, in line with section 4 of the Act, the conditions we are setting will, in particular, promote infrastructure based competition and will encourage innovation and continued investment for the purpose of securing efficiency and sustainable competition in the downstream market for electronic communications networks and services, resulting in the maximum benefit for retail consumers.

Consistency with European Commission Recommendations and BEREC Common Positions and Guidance

- 5.197 In accordance with section 4A of the Act, in reaching the decisions set out in this consultation, Ofcom has also taken due account of all applicable recommendations issued by the European Commission under Article 19(1) of the Framework Directive and the utmost account of any relevant opinion, recommendation, guidelines, advice or regulatory practice adopted by the Body of European Regulators for Electronic Communications (BEREC pursuant to Article 3(3) of Regulation (EC) No 1211/2009), in particular Point 14 and Annex I (concerning pricing of access to physical infrastructure) of the European Commission's NGA Recommendation⁵⁴⁹.
- 5.198 The PAG argued that, in using BT's current methodology as the starting point for our calculation of maximum rental charges, we have failed to have regard to the EC's

⁵⁴⁹ Commission Recommendation of 20 September 2010 on regulated access to next generation access networks, 2010/572/EU). <http://eur-lex.europa.eu/LexUriServ/%20LexUriServ.do?uri=OJ:L:2010:251:0035:0048:en:PDF>.

recommendation that a bottom-up approach is required to achieve a NRA's objectives in these circumstances.⁵⁵⁰ We disagree. The recommendation states that the BU LRIC+ costing methodology is preferable when setting access prices for copper and NGA services, but is not appropriate for legacy civil engineering assets.⁵⁵¹

⁵⁵⁰ The PAG response to the August 2017 DPA Consultation, paragraph 18. Commission recommendation of 11.9.2013 on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment, C(2013) 5761 final.

⁵⁵¹ Commission recommendation of 11.9.2013 on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment, C(2013) 5761 final, recitals 34 to 35 and paragraphs 34 to 35.

6. Improvements to PIA process and systems

- 6.1 In this section we set out our decision to require BT to publish a Reference Offer specifying the terms and conditions on which BT will provide PIA.⁵⁵² This Reference Offer condition sets out those areas that as a minimum must be included in the Reference Offer.
- 6.2 In some cases, we have decided to maintain the requirements included in the current PIA Reference Offer condition. In other cases, we are introducing new requirements in the PIA Reference Offer condition.
- 6.3 We also set out our views on how the processes and systems for PIA could be improved within the broader context of our conclusions relating to the PIA remedy. In a number of instances, we consider that these improvements would benefit from industry discussions chaired by the OTA2.⁵⁵³ ⁵⁵⁴ While we do not prejudge the outcome of those discussions, we will monitor their progress closely. If those discussions prove to be unsuccessful in reaching an industry consensus on the improvements that we identify, we retain our Direction making powers to intervene.
- 6.4 The decisions and discussion in this section supplement those decisions set out in Section 2 and Section 3 relating to BT's network access requirements and BT's non-discrimination obligations respectively, in some cases providing more detail on those requirements.

Overview of stages in deploying an access network

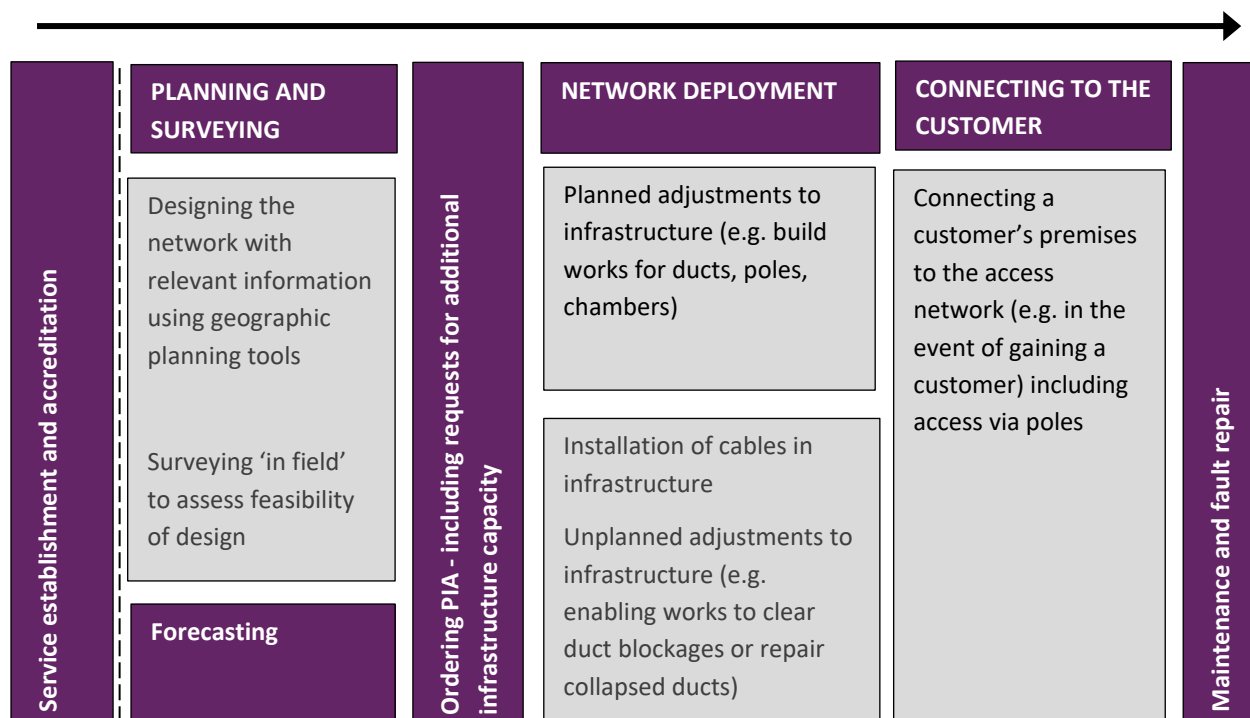
- 6.5 The activities required to deploy an access network can be broadly categorised into three main stages: planning and surveying; network deployment; and connecting to the customer.
- 6.6 For telecoms providers intending to use PIA to deploy a network, BT currently requires that telecoms providers complete a preliminary stage known as service establishment before using PIA for the first time. As part of this the telecoms provider must fulfil a set of accreditation requirements and sign a PIA contract. In addition, BT currently requires telecoms providers to provide a forecast of their future use of PIA.
- 6.7 Subsequent to placing an order to use PIA, the telecoms provider is able to deploy its network using BT's physical infrastructure. Following the deployment of a network, a telecoms provider will also need to undertake maintenance and fault repair activities. We represent these stages in Figure 6.1 below.

⁵⁵² This section supplements our reasoning and decisions to impose on BT various Reference Offer requirements relating to network access which are set out in Volume 1.

⁵⁵³ Office of the Telecommunications Adjudicator (OTA2) is an independent organisation tasked by Ofcom to oversee co-operation between communications providers and enable a competitive environment in the telecommunications sector. Its primary task is to deal with major or strategic issues affecting the rollout and performance of products provided by Openreach.

⁵⁵⁴ It may be that the outcome of these discussions will be reflected by BT in future versions of the Reference Offer.

Figure 6.1: Key stages of an access network deployment using PIA



6.8 We use these main stages depicted in Figure 6.1 as a framework to examine the PIA processes (and associated support systems); the potential issues associated with those processes (including an assessment of stakeholder evidence provided in response to our April 2017 DPA Consultation and our August 2017 DPA Consultation); and to specify the areas that as a minimum must be included in the Reference Offer.

PIA service establishment and accreditation

- 6.9 Before a telecoms provider can purchase PIA, BT currently requires that a telecoms provider completes a service establishment and accreditation stage.
- 6.10 Service establishment is a contractual engagement process that is the first stage in gaining access to BT's infrastructure. Telecoms providers only have to complete this process once. Completion of this stage is contingent on telecoms providers signing Openreach's PIA contract and meeting various contractual requirements, such as demonstrating that they have public liability insurance.
- 6.11 Openreach requires that all operatives working on BT's infrastructure network must be accredited to Openreach's standards for the tasks performed, for example training in the use of a gas monitor when working in a BT chamber.⁵⁵⁵ Accreditation is awarded on an individual operative basis following an assessment of the material covered in the relevant accreditation module. The telecoms provider is currently responsible for maintaining a

⁵⁵⁵ Information relating to accreditation standards relevant to using Openreach's physical infrastructure is published on Openreach's website.

register of its accredited operatives and Openreach reserves the right to undertake accreditation audits of operatives against those listed on a telecoms provider's register.

- 6.12 Accreditation operates by a 'train the trainer' scheme whereby telecoms providers and contractors can employ their own Assessors or Lead Assessors to accredit operatives independently of Openreach. Telecoms providers must establish an auditing process to ensure that the quality of work continues to meet standards and Openreach currently reserves the right to audit operatives' work.

Our proposals

- 6.13 In our April 2017 DPA Consultation, we considered that conditions, including appropriate training, certification and authorisation requirements for other telecoms providers' personnel to gain access to BT's infrastructure remain necessary to maintain engineering standards across BT's infrastructure network. In order that such requirements are clear to all telecoms providers seeking access, we proposed that the PIA Reference Offer condition should continue to require that the Reference Offer includes:
- conditions for Third Parties to gain access to Physical Infrastructure including if appropriate training, certification and authorisation requirements for personnel to access and work in/on Physical Infrastructure.

Stakeholder responses

- 6.14 Openreach supported our proposals on service establishment and accreditation, noting the significant degree of flexibility in the 'train the trainer' approach that enables telecoms providers to be in full control of their own accreditation of operatives and the timescales in which they can achieve this. It stated that a key priority is maintaining safe working and appropriate quality standards across the network. It also noted that its processes and accreditation requirements mirror those it requires of its own contractors.⁵⁵⁶
- 6.15 CityFibre raised concerns about the small number of training providers able to provide accreditation (highlighting a particular issue with cable works). It recognised that this might be a short-term problem, but suggested that Ofcom monitor this and apply pressure on Openreach to identify and address training bottlenecks where they arise.⁵⁵⁷
- 6.16 TalkTalk suggested that the process for registering operatives to work on Openreach infrastructure is automated and online.⁵⁵⁸

Our reasoning and decisions

- 6.17 We consider that training and accreditation requirements continue to be necessary to maintain safety and quality standards.

⁵⁵⁶ Openreach response to the April 2017 DPA Consultation, page 48.

⁵⁵⁷ CityFibre response to the April 2017 DPA Consultation, page 43.

⁵⁵⁸ TalkTalk response to the April 2017 DPA Consultation, page 9.

- 6.18 Openreach has noted that its processes and accreditation requirements for Third Parties mirror those it requires of its own contractors. We support this approach since our view is that training requirements, accreditation audits and security checks for other telecoms providers (and their contractors) should not place them at a disadvantage relative to Openreach's contractors.
- 6.19 While we acknowledge CityFibre's concern that there may be a limited number of parties currently offering training relevant to awarding accreditation, we do not consider this will significantly impede telecoms providers in training their own contractors (or staff). This is because accreditation operates by a 'train the trainer' scheme. Under the scheme, once trained and accredited, telecoms providers and contractors can employ and act as their own Assessors or Lead Assessors in accrediting operatives independently of Openreach.
- 6.20 TalkTalk suggested that the process for registering operatives should be automated online. We consider that the current process whereby telecoms providers are responsible for maintaining a register of their accredited operatives is suitable to support large-scale network. As such, it should not be unduly onerous or result in unnecessary delays to telecoms providers intending to deploy networks using PIA. Our view is that this approach allows Openreach to audit the accreditation of operatives in a way that is not onerous for telecoms providers and without the need to establish an automated online system.
- 6.21 In summary, we believe that conditions, including appropriate training, certification and authorisation requirements for other telecoms providers' personnel to gain access to BT's infrastructure, remain necessary to maintain engineering standards across BT's infrastructure network. In order that such requirements are clear to all telecoms providers seeking access, we have decided that these should be set out in the PIA Reference Offer. Therefore, we have decided that the PIA Reference Offer continues to include:
- conditions for telecoms providers to gain access to Physical Infrastructure including if appropriate training, certification and authorisation requirements for personnel to access and work in/on Physical Infrastructure.

Forecasting

- 6.22 Under the current arrangements for PIA, Openreach includes a contractual requirement for telecoms providers to submit a forecast for the forthcoming three months of how much duct rentals and how many pole rentals are likely to be ordered; and how much enabling and build work will be required, for each exchange area.⁵⁵⁹ Openreach state that any actual demand in excess of 20% over forecast will not be subject to the normal service delivery timescales.

⁵⁵⁹ The telecoms provider is also required to state the month in which the order will be made.

Our proposals

- 6.23 In our April 2017 DPA Consultation, we considered that in principle, a requirement for telecoms providers to submit forecasts of their PIA usage will be important in assisting Openreach to plan its resources. It is also important that such requirements are clearly set out so that there is transparency for all telecoms providers. Consequently, we proposed that the PIA Reference Offer should include:
- conditions for the provision of forecasts by Third Parties in respect of their future requirements for PIA.
- 6.24 We did not propose to prescribe the specific terms and conditions that should be included in any revised forecasting process and our view was that industry and Openreach are well placed to agree the arrangements.
- 6.25 We noted more broadly that the non-discrimination obligations we proposed in the April 2017 DPA Consultation would mean that the process and data gathered for forecasting duct and pole demand for telecoms providers under PIA should be equivalent to the forecast requirements used by Openreach itself, for the purposes of deploying its own fibre broadband services, unless such differences can be justified. Accordingly, we considered that this approach would ensure that a third-party telecoms provider would not be put at a disadvantage in terms of extra cost, time or uncertainty, compared to the processes Openreach follows internally.
- 6.26 We noted that any information provided to Openreach for the purposes of negotiating network access is protected through the requirements set out in General Condition 1.2. This means Openreach is required to treat any information provided to it for these purposes in confidence, not passing it to any other part of Openreach where it could provide a competitive advantage. Therefore, we expected to see any forecasts provided by PIA users suitably anonymised and treated by Openreach as part of its internal workflow processes for other duct and pole build works.

Stakeholder responses

- 6.27 Openreach supported Ofcom’s proposal that telecoms providers should be required to provide full and proper forecasts to Openreach and the acknowledgement that this is important for Openreach (and external parties) to plan resources.⁵⁶⁰
- 6.28 Openreach considered that it is important that if telecoms providers forecast inaccurately they do not still expect Openreach to deliver on Service Level Agreements (SLAs) and make payments relevant to Service Level Guarantees (SLGs).⁵⁶¹
- 6.29 CityFibre was broadly content with there being forecasting requirements in the PIA process, however, it raised concerns around the existing time horizons for forecasting, noting that they map uneasily onto CityFibre’s planned city-wide fibre upgrade timescales.

⁵⁶⁰ Openreach response to the April 2017 DPA Consultation, page 48.

⁵⁶¹ Openreach response to the April 2017 DPA Consultation, page 49.

CityFibre expected to typically present a ‘city-wide’ plan for undertaking works over a fifteen to eighteen months period with the exact sequencing of works within that plan subject to a degree of change, for instance as a result of consultations with street works authorities. As such, it would prefer an approach to forecasting that allowed an outline plan to be presented (including survey requests, and where appropriate reservations, which could then be fine-tuned over time, albeit with reasonable advance notice being given to Openreach). CityFibre was also concerned that data provided to Openreach could be used by Openreach to tactically adjust its own rollout plans.⁵⁶²

- 6.30 TalkTalk considered the existing requirement to provide a 12-month forecast was disproportionate. It was concerned these requirements were being used with the intention of avoiding SLG payments rather than improving resource planning and performance. TalkTalk also argued that equivalent forecasting requirements would be meaningless given Openreach cannot financially penalise itself if its own forecasts are inaccurate.⁵⁶³
- 6.31 [X] argued that Openreach’s own analysis should be driving resource demand (as opposed to telecoms provider forecasts). It also questioned Openreach’s attempts to link forecasting to SLG payments and suggested that this offers no improvement to the provisioning process. It referred to Ofcom’s 2008 document “Service Level Guarantees: Incentivising Performance”⁵⁶⁴ which considered it was not appropriate or proportionate to contractually link forecasting and compensation arrangements.⁵⁶⁵
- 6.32 TalkTalk expected Ofcom to put in place processes to monitor Openreach’s compliance with General Condition 1.2 to ensure that information provided by PIA users is appropriately anonymised.⁵⁶⁶

Our reasoning and decisions

- 6.33 We continue to consider that in principle, a requirement for telecoms providers to submit forecasts of their PIA usage will be important in assisting Openreach to plan its resources. Furthermore, it is important that such requirements are clearly set out so that there is transparency for all telecoms providers.
- 6.34 We do not fully accept [X] contention that Openreach’s own analysis should be driving resource demand (as opposed to the telecoms providers forecasts). While Openreach’s own analysis will play a role in determining how to plan its resources, it is reasonable to expect that its analysis is supported by information provided by telecoms providers around their expected usage of PIA.
- 6.35 We acknowledge the concerns raised by some telecoms providers that there is a risk of forecasting requirements being used by Openreach to avoid SLG payments.

⁵⁶² CityFibre response to the April 2017 DPA Consultation, page 43.

⁵⁶³ TalkTalk response to the April 2017 DPA Consultation, page 10.

⁵⁶⁴ Ofcom, 2008. *Service Level Guarantees: Incentivising Performance, Statement and Directions*.
https://www.ofcom.org.uk/data/assets/pdf_file/0020/33617/statement.pdf.

⁵⁶⁵ [X]

⁵⁶⁶ TalkTalk response to the April 2017 DPA Consultation, page 10.

Notwithstanding this, we consider that in relation to Openreach meeting SLA targets and therefore its financial exposure to SLG payments, it will need to plan its resources and therefore forecasts of PIA usage (in some form) will be needed. [38] referred to Ofcom's 2008 Statement "Service Level Guarantees: Incentivising Performance" which considered that it was not appropriate or proportionate to contractually link forecasting and compensation arrangements. While we acknowledge this point, the 2008 Statement was in relation to the provision and repair of Wholesale Line Rental (WLR), Local Loop Unbundling (LLU) and Ethernet services (and to address issues that were relevant to those services). Our view is that unlike WLR, LLU and Ethernet services, PIA is a relatively immature product and that the likely take-up (including the types of network adjustments required) over the forthcoming market review period will be difficult to forecast based on past volumes alone. As such, the planning of resources relevant to meeting SLA targets and SLGs will be difficult for Openreach unless telecoms providers have a role in providing reasonable forecasts of their usage.

- 6.36 Our view is that the detailed arrangements for forecasting, including the information to be provided, any linkage with SLA/SLGs and the timescales over which forecasts should be provided, are best agreed through industry discussions between Openreach and other telecoms providers. Therefore, we are not prescribing the specific terms and conditions that should be included in any revised forecasting process.
- 6.37 With regards to TalkTalk's concerns about the effectiveness of a non-discrimination obligation applied to forecasting requirements, we accept that Openreach cannot financially penalise itself if its own forecasts are inaccurate. We nevertheless consider that a non-discrimination requirement has a role to play in relation to forecasting. For example, we expect the timescales that Openreach set internally for planning and implementing network deployments should not be misaligned with forecasting requirements for PIA users. As an illustration, if Openreach can commence a full-fibre rollout at three months' notice, we would not expect that other telecoms providers are required to provide forecasts (or those forecasts linked to agreed SLAs/SLGs) in advance of three months. Therefore, we consider that the non-discrimination obligations we set out in Section 3 will apply to forecasting requirements.
- 6.38 As outlined in our April 2017 DPA Consultation, any information provided to Openreach for the purposes of negotiating network access is protected through the requirements set out in General Condition 1.2. Openreach is required to treat any information provided to it for these purposes in confidence, not passing it to any other part of Openreach where it could provide a competitive advantage. Accordingly, we would expect to see any forecasts provided by PIA users suitably anonymised and treated by Openreach as part of its internal workflow processes for other duct and pole build works.
- 6.39 TalkTalk suggested that Ofcom should put in place processes to monitor Openreach's compliance with General Condition 1.2. We do not consider it necessary to introduce a specific process to monitor compliance with General Condition 1.2 for PIA that goes beyond our existing powers for assessing compliance with Openreach's regulatory obligations.

- 6.40 In light of the above, we have decided that the PIA Reference Offer should include:
- conditions for the provision of forecasts by telecoms providers in respect of their future requirements for PIA.

Planning and surveying

- 6.41 To plan access networks using PIA, telecoms providers need access to Openreach's duct and pole network records including: information about the location of ducts, joint boxes, manholes and poles; descriptive information about assets such as joint box sizes; and where available, information about the extent of spare capacity to accommodate the telecoms providers' networks.
- 6.42 Telecoms providers may also require access to Openreach's physical infrastructure to undertake field surveys to determine the actual location, condition and capacity of Openreach's duct and poles.
- 6.43 On completion of the planning stage a telecoms provider will be able to enter an agreement with Openreach to deploy its network using PIA and begin its field engineering activities.
- 6.44 In the following sub-section, we first set out our reasoning and decisions relating accessing BT's network records. In the subsequent sub-section, we set out our reasoning and decisions relating to telecoms providers surveying BT's physical infrastructure.

Our proposals

Access to network records

- 6.45 In our April 2017 DPA Consultation, we noted that significant expense is incurred in field engineering works. We therefore considered an effective planning and survey process to be a critical step in allowing a telecoms provider to undertake its field engineering works in an efficient way, with minimal changes to its planned network deployment once in the field. Accordingly, we considered that to deploy access networks at scale, telecoms providers need access to the infrastructure records that Openreach makes available to its own planners in a suitable format, so that they can plan networks in an equivalent or comparable manner to BT.
- 6.46 We therefore proposed that it is necessary to maintain the requirement that the PIA Reference Offer includes:
- the location of Physical Infrastructure or the method by which Third Parties may obtain information about the location of Physical Infrastructure.

Network records database

- 6.47 We considered the extent to which we should impose further requirements on BT to specify what the infrastructure information should comprise; and in what format that

information should be provided. Our view was that the format and content of the network records Openreach provides to telecoms providers should include the following attributes:

- Network records: network records should be provided to telecoms providers in a digital format that is suitable for importing (at sufficient scale) into telecoms providers' GIS⁵⁶⁷ network planning tools for the purposes of deploying networks at scale. We considered that telecoms providers should have access to information to allow them to plan in geographic areas of a scale broadly similar to that served by an Optical Local Exchange area.
- Granularity of information: the network records should be sufficiently granular for telecoms providers to plan access networks without undertaking field surveys as a precursor. They should therefore include location information for ducts, joint boxes, manholes and poles, and associated attribute information such as element identifiers, pole sizes, number of duct bores and joint box/manhole sizes.
- Capacity Information: capacity calculations that Openreach holds should be made available to telecoms providers in a suitable format. This should take account of capacity that has been reserved but not yet used.
- Element attribute information for billing: the network records provided by Openreach should contain sufficient detail about element attributes (e.g. joint box size or the number of duct bores on a duct segment) for telecoms providers to calculate PIA charges for their planned network deployments.

6.48 We acknowledged that since our 2016 PIA Consultation, Openreach had taken important steps to improve the effectiveness of the PIA product by improving access to its network records through the introduction of its PIA Digital Map Tool and by withdrawing the requirement for telecoms providers to undertake field surveys as a precursor to order submission.

6.49 However, we also considered it necessary to ensure that the detailed technical specifications of the PIA Digital Map Tool would allow telecoms providers to plan large scale networks effectively. In this regard, we considered that system uptime and download speeds and download limits that apply were likely to be important. To understand the potential timescales and costs involved in developing systems to support PIA generally, we commissioned external consultants Mott MacDonald to produce a systems requirements specification that could be used to support and deliver the proposals in the April 2017 DPA Consultation. As such Mott MacDonald's systems specification went further than allowing access to network records only, and also allowed for ordering, validation of orders and exchanges of information between Openreach and telecoms providers relevant to network deployments using PIA).⁵⁶⁸

⁵⁶⁷ A geographic information system (GIS) is a system designed to capture, store, manipulate, analyse, manage, and present all types of geographical data.

⁵⁶⁸ Mott MacDonald, 2017. *DPA Solution System Requirements Specification*.

https://www.ofcom.org.uk/_data/assets/pdf_file/0013/101542/duct-pole-access-report-mott-macdonald.pdf.

Ancillary service obligation

- 6.50 In view of the importance of digital network records and the associated systems specifications to the effectiveness of the PIA remedy, we proposed to specify, as part of our proposed network access obligation, that BT must provide access to a database of information on the location of BT's physical infrastructure (PIA Database Access) as a PIA Ancillary Service.

Stakeholder responses

Network records database

- 6.51 Openreach said that significant progress had been made with its PIA Digital Map Tool and indicated that telecoms providers now have access to the same source of infrastructure information as Openreach's planners use to plan fibre networks.⁵⁶⁹ Openreach argued that the PIA Digital Map Tool met the infrastructure information attributes proposed by Ofcom. In particular:
- Network records – in March 2017, Openreach introduced 'web services' functionality allowing telecoms providers to export Openreach infrastructure information to their own GIS systems.
 - Granularity of information - the PIA Digital Map Tool provides detail on ducts, poles, joint boxes, manholes and associated attribute information such as duct bores and sizes to enable telecoms providers to plan, survey and order the PIA product.
 - Capacity information - in March 2017 Openreach added capacity information to the PIA Digital Map Tool in the form of a 'RAG' status providing an automated estimate of capacity which also accounted for space that had been reserved by telecoms providers.
 - Element attribute information for billing – the PIA Digital Map Tool provides all duct and joint box information required to determine PIA charges.⁵⁷⁰
- 6.52 In relation to Mott MacDonald's Systems Requirements Specification, Openreach noted that at a high level, the approach outlined appeared to be in line with Openreach's systems architecture. Openreach stated that much is already covered by the systems Openreach is developing for PIA including online access to infrastructure maps and a workflow solution for the provisioning process.
- 6.53 Openreach said it had not had time to study the report in detail, but its initial view was that the report did not reflect the complexity of dependencies with its core systems and the wider impacts of Ofcom's proposals. The costs and timings specified in the report would therefore represent one element of the solution that would be required to support Ofcom's proposals. Openreach also identified several aspects of the specifications which are not part of its planned systems developments:

⁵⁶⁹ Openreach response to the April 2017 DPA Consultation, page 49.

⁵⁷⁰ Openreach response to the April 2017 DPA Consultation, page 49.

- a) Mobile access to records – Openreach’s current architecture and security rules do not support third-party mobile access.⁵⁷¹
 - b) Updates to records – infrastructure records are updated via a process that relies on Openreach’s eRecords team manually updating PIPEr from a field return. Currently, this process takes around one week. As such, the specification proposed by Mott MacDonald of a 24hr update SLA would not be feasible with today’s architecture.
 - c) Download limits – Openreach’s initial view was that it would not be feasible for infrastructure records for a 10km² area to be downloaded. Firstly, because the file sizes would be too large to download in a reasonable time and because concurrent requests could jeopardise performance of the dialogue services gateways.⁵⁷² Secondly, because allowing telecoms providers to download such large amounts of information would allow telecoms providers to build up a complete picture of Openreach’s network assets thereby presenting a security risk.⁵⁷³
- 6.54 CityFibre and Flomatik both supported our view that the database should allow for examination of network records at a scale of an Optical Local Exchange area.⁵⁷⁴ Flomatik also proposed that the PIA Digital Map Tool could be improved by including information on underground lead-ins and where these are connected to the final Distribution Point (DP) chamber (since this would give information about the direction of a swept-t⁵⁷⁵); and information on overhead distribution.⁵⁷⁶ Flomatik suggested that both sets of information are held by Openreach.⁵⁷⁷

Our reasoning and decisions

- 6.55 Significant expense is incurred in field engineering works and hence an effective planning and survey process is a critical step in allowing telecoms providers to undertake field engineering works in an efficient way, with minimal changes to network plans once in the field. An effective planning and survey process for PIA is therefore an essential element of the PIA remedy. Accordingly, we consider that to deploy access networks at scale, telecoms providers need access to the infrastructure records in a suitable format so that they can plan networks in an equivalent or comparable manner to BT. We have therefore decided that it is necessary to maintain the requirement that the PIA Reference Offer includes:

⁵⁷¹ Openreach response to the April 2017 DPA Consultation, paragraph 363.

⁵⁷² Dialogue Services are the electronic systems used by Openreach to support exchanges of information with its customers relating to order provisioning and assurance processes.

⁵⁷³ Openreach response to the April 2017 DPA Consultation, page 84.

⁵⁷⁴ CityFibre response to the April 2017 DPA Consultation, page 44; Flomatik response to the April 2017 DPA Consultation, page 6.

⁵⁷⁵ Swept-t joints are commonly used to connect Openreach’s underground lead-in ducts to Openreach’s spine duct (and thereafter the connect to other parts of Openreach’s physical infrastructure).

⁵⁷⁶ For example, network information relating to overhead dropwires that provide a connection from a pole to the customer premises.

⁵⁷⁷ Flomatik response to the April 2017 DPA Consultation, page 5.

- the location of Physical Infrastructure or the method by which telecoms providers may obtain information about the location of Physical Infrastructure.
- 6.56 In support of this obligation, we consider it is essential that network records are provided in a digital format and that those records should have the attributes identified in the April 2017 DPA Consultation (as listed in paragraph 6.47 above).
- 6.57 We acknowledge that Openreach has taken important steps to improve the effectiveness of the PIA product since the publication of our Digital Communications Review in February 2016, through the introduction of the PIA Digital Map Tool. This provides electronic access to Openreach’s network records, replacing an earlier manual process under which network records were provided by email in a digital image format. Except for a small proportion of records relating to sensitive locations, telecoms providers now have access to the infrastructure information relating to ducts, chambers and poles that is available to Openreach planners in Openreach’s network records system Piper. We also note that Openreach plans to make further improvements to the PIA Digital Map Tool.
- 6.58 Notwithstanding these changes, we consider that further developments are required to allow telecoms providers to plan large scale networks effectively. Although we consider that these developments are best agreed between Openreach and telecoms providers at the Passive Infrastructure Working Group (PIWG)⁵⁷⁸, we set out below some relevant considerations. These include the provision of additional information about defective poles, an increase to download limits for infrastructure information and the possible development of a manual interface for record downloads. It is also possible that telecoms providers may identify further requirements as they gain experience with using PIA. Although we will not be directly involved in the PIWG work, we intend to monitor developments carefully.
- 6.59 In view of the importance of digital network records, and the associated systems specifications to the effectiveness of the PIA remedy, we consider that it is not sufficient to solely impose a requirement for the PIA Reference Offer to include information about the location of physical infrastructure. We have therefore decided the network access obligation should include an obligation for BT to offer electronic access to its physical infrastructure records as a PIA Ancillary Service. While we will continue to allow BT to develop the database specification without our direct involvement, this obligation will enable us to impose requirements if Openreach and telecoms providers are unable to reach agreement or if we consider that the functionality provided by BT is insufficient to support scale deployment using PIA.

⁵⁷⁸ The Passives Infrastructure Working Group (PIWG) comprises of Openreach and telecoms providers and is chaired by the Office of the Telecommunications Adjudicator (OTA2). The PIWG is a forum that seeks agreement on how new and enhanced product functionality and/or processes relevant to accessing Openreach’s physical infrastructure can be delivered.

Support for scale network planning – download limits for infrastructure information

- 6.60 As noted above, in its response to the April 2017 DPA Consultation, Openreach referred to the technical and security issues associated with allowing telecoms providers to download infrastructure information in larger blocks such as a 10km² area specified by Mott MacDonald in its systems specification.
- 6.61 We continue to consider that telecoms providers should have the ability to download infrastructure information into their own GIS planning tools in units commensurate with planning network deployment at scale and that an Optical Local Exchange is a good representation of a planning unit for a scale deployment. Moreover, we note that as the provision of PIA will be subject to a non-discrimination obligation, telecoms providers should not be at a disadvantage relative to BT in this regard. Downloads are currently limited to file sizes of up to 2Mb per search (and subject to Openreach's fair usage rules more generally). We therefore remain of the view that this is an aspect of the PIA Digital Map Tool that requires further development to ensure that it is fit for scale network planning and that telecoms providers are not disadvantaged relative to BT.
- 6.62 We acknowledge that it will be necessary to consider the technical and security implications of larger download limits (including for example, file download times and the performance impact on Openreach's systems) and that systems enhancements, such as additional processing capacity, may be required. We also acknowledge there may be trade-offs between performance, functionality and costs.
- 6.63 As noted above, further work is required to develop specifications and we therefore consider these developments are best agreed between Openreach and telecoms providers at the PIWG.
- 6.64 We also note that as part of our WLA Charge Control, we have included an allowance for Openreach to develop its processes and systems in support of improving access to its physical infrastructure.

Manual data download functionality

- 6.65 Openreach has introduced functionality which enables telecoms providers to export infrastructure information from Openreach's systems in a format suitable for importing into GIS planning systems. To use this functionality, known as 'web-services', telecoms providers must develop software that is compliant with a network interface specified by Openreach. This functionality is therefore likely to be suitable for telecoms providers who have the capability to develop such software and whose planning systems can support such an interface. Consequently, this interface may not be suitable for all telecoms providers. Our view is that if there is sufficient demand from telecoms providers, Openreach could develop a manual download interface in the PIA Digital Map tool.

Granularity of network information (including information on available capacity)

- 6.66 One of the attributes that we have identified for network records relates to the granularity of the network records Openreach provides to telecoms providers. We consider that

- Openreach should provide network records at a sufficiently granular level for telecoms providers to plan access networks without undertaking field surveys as a precursor.
- 6.67 In this regard, Openreach has made significant steps through its PIA Digital Map Tool. With the exception of a small proportion of records relating to sensitive locations, telecoms providers now have access to the infrastructure attribute information relating to ducts, chambers and poles⁵⁷⁹ that is available to Openreach planners in Openreach's network records system Piper. Openreach also provides capacity estimates for ducts derived from its cable records.
- 6.68 Our view is that this is an important milestone. Telecoms providers now have access to essentially the same information about ducts, chambers and poles that Openreach's own planners use to plan fibre networks, significantly reducing the risk of telecoms providers being at a disadvantage to Openreach when planning their own network deployments using Openreach's physical infrastructure.
- 6.69 The infrastructure information provided in the PIA Digital Map Tool does not contain all of the information required for network planning, principally because Openreach does not record certain information. For example, Openreach does not have records of the spare capacity in its chambers for additional cables and equipment. The additional information about underground lead-in ducts and the distribution of overhead dropwires identified by Flomatik also falls into this category. Openreach has told us that it has records for only a minority of its lead-in ducts, because historically it did not keep records of lead-in ducts, and that it does not have any records of the radial distribution of dropwires on poles.⁵⁸⁰ Moreover, there are some gaps and inaccuracies in Openreach's network records. For example, a proportion of Openreach's chamber records do not specify the chamber type and size.
- 6.70 Gathering additional information to address these gaps proactively would require Openreach to carry-out extensive field surveys and is likely to be prohibitively expensive. Consequently, we consider it is unlikely to be proportionate for us to require it.
- 6.71 Telecoms providers are therefore likely to want to undertake field surveys as part of their planning activities, particularly if they plan to use Openreach's poles given the need to consider safety issues (such as safe access) and to assess pole loading. Importantly, as telecoms providers have access to the same information as Openreach, they should be in a comparable position to Openreach with regards to field surveys.
- 6.72 Notwithstanding the above, we have identified information relating to Openreach's pole replacement programme that we consider should also be made available to other telecoms providers using PIA. This information is a central database that records poles that are scheduled to be replaced within the next two years due to being defective in some way.⁵⁸¹

⁵⁷⁹ Openreach has also indicated that it plans to make further developments to the PIA Digital Map Tool that will provide users with information relating to whether a pole has been reserved. Openreach response to question 26 of the WLA s.135 notice issued on 12 October 2017.

⁵⁸⁰ Openreach response to question 14 and 15 of the WLA s.135 notice issued on 6 March 2017.

⁵⁸¹ Openreach response to question 10 of the WLA s.135 notice issued on 12 October 2017.

- 6.73 Our view is that this information is relevant to telecoms providers planning, particularly in relation to the timing of network deployment. For example, telecoms providers may choose to delay their own network deployment until after defective poles have been replaced to avoid re-works relating to re-fixing equipment to a new pole.
- 6.74 Therefore, as part of the PIA Database Access requirement we are imposing, we consider that Openreach should allow telecoms providers access to the information it has relating to the identification of defective poles.⁵⁸² Our view is that there are processes for gathering this information and for updating the information (as poles are replaced or repaired), providing this information to telecoms providers would be straightforward.

Our proposals

Survey requirements

Field surveys

- 6.75 In our April 2017 DPA Consultation, we acknowledged the recent changes that Openreach had made to the requirements for field surveys, including removing a requirement to provide a prescribed set of survey information prior to ordering PIA. We considered that these were important steps in improving the effectiveness of the planning process, relative to the previous process where field surveys were a necessary precursor to planning a network.⁵⁸³
- 6.76 We anticipated that telecoms providers intending to use PIA to deploy large scale networks would still be likely to find it necessary to undertake field surveys as part of their planning process. However, given the changes to the field survey requirements, the choice of whether to undertake a survey, and the extent of that survey, would be based on the telecoms provider's own judgement (including assessing the risks of not undertaking a survey prior to making a PIA reservation).
- 6.77 Our expectation was that information relating to Openreach's infrastructure gathered as part of a telecoms provider's survey is likely to be useful to Openreach and other telecoms providers going forwards. Therefore, we expected that arrangements are developed so that the information gathered is used to improve the quality of Openreach's network record information (and update its network record information) contained in its database.

Responsibility for pole surveys

- 6.78 We considered that a specific area where a field survey is likely to be particularly important is when a telecoms provider is planning to use BT's poles to connect prospective customers. This is because the records provided in the PIA Digital Map Tool provide the

⁵⁸² For the avoidance of doubt, we are not at this time requiring this to be provided as part of the PIA Digital Map Tool.

⁵⁸³ Under the revised arrangements, the need for field surveys is largely confined to activities that would typically be undertaken after network plans have been developed. These include gathering information that is not recorded in Openreach's records and checking the accuracy of Openreach's records that directly relate to the network plan. We also note that telecoms providers now have the option to deploy networks without field surveys and to make minor adjustments during deployment if, for example, Openreach's records are inaccurate.

location and size of poles, but not all of the other information required to assess the viability of using that pole; in particular, the condition of the pole, including whether it can be climbed; whether the pole has a steel ring (known as a ringhead) which new dropwires must be attached to; and the number and radial distribution of dropwires.

- 6.79 Our view was that surveying the condition of the pole; identifying whether it is safe to climb; and identifying whether additional apparatus needs to be installed, could be undertaken by a telecoms provider's own accredited engineers. Completion of a survey will allow a telecoms provider to ascertain whether a pole is ready for use (including whether it can accommodate the telecoms provider's equipment on the pole).⁵⁸⁴
- 6.80 Currently, Openreach stipulates that where a telecoms provider intends to deploy an aerial cable to a pole, a joint-survey of the pole is required by Openreach.
- 6.81 We acknowledged that assessing available capacity on a pole is less straightforward than determining the available capacity in a duct, since the former will not only depend on the size of the pole and the number of existing dropwires attached to it, but also the radial distribution of those dropwires. Notwithstanding this, we considered that for a telecoms provider intending to use PIA at scale it is important that it can connect customers efficiently and with minimal interventions by Openreach.
- 6.82 We proposed that the PIA Reference Offer should include:
- procedures for the provision of information to Third Parties about spare capacity, including arrangements for visual surveys of Physical Infrastructure to determine spare capacity.
 - conditions for the inspection of the Physical Infrastructure at which access is available or at which access has been refused on grounds of lack of capacity.

Other planning requirements

- 6.83 There is a requirement in the existing PIA Reference Offer to include:
- technical specifications for Physical Infrastructure Access including:
 - technical specifications for permitted cables and associated equipment; and
 - cable installation, attachment and recovery methods.
 - the methodology for calculating availability of spare capacity in Physical Infrastructure;
 - conditions for reserving capacity that shall apply equally to BT and Third Parties.
- 6.84 We proposed that the PIA Reference Offer continues to include these same requirements because these conditions will need to be known by a telecoms provider planning to use PIA

⁵⁸⁴ We noted that in a response to a formal information request, Openreach had confirmed that currently all adjustments to a pole must be carried out by Openreach, bar the installation of a pole top ringhead. Furthermore, we considered that our proposals in relation to network access would mean that in the future, the telecoms provider could request Openreach to make adjustments to the pole at the time of ordering PIA.

to deploy a network since they will have a bearing on the design and deployment of that network.

Stakeholder responses

Survey requirements

Field surveys

- 6.85 Two stakeholders commented on our proposal that telecoms providers' survey information could be used to improve Openreach's network records. CityFibre suggested that one option would be for telecoms providers to be required to provide survey information in exchange for payments from Openreach.⁵⁸⁵ Openreach noted that it would be difficult for it to rely on information provided by telecoms providers without some form of warranty from the telecoms provider, so as to maintain the integrity of the records.⁵⁸⁶

Responsibility for pole surveys

- 6.86 TalkTalk supported our proposal that telecoms providers should be able to undertake pole surveys.⁵⁸⁷
- 6.87 Openreach emphasized the complexity of pole capacity assessments (given the need to assess both space utilisation and radial distribution loadings). It noted that while allowing accredited telecoms providers to survey a pole for a dropwire of up to 1.8kN breaking load may be reasonable, deploying cables with a breaking load greater than >1.8kN requires more specialist training and knowledge. It suggested that our proposals could be taken forward by industry as part of the new PIA Reference Offer discussions (where the issue could be examined in detail).⁵⁸⁸

Other planning requirements

- 6.88 We did not receive stakeholder comments related to the proposed requirement for the PIA Reference Offer to include:
- technical specifications for Physical Infrastructure Access including:
 - technical specifications for permitted cables and associated equipment; and
 - cable installation, attachment and recovery methods;
 - the methodology for calculating availability of spare capacity in Physical Infrastructure;
 - conditions for reserving capacity that shall apply equally to BT and Third Parties.

⁵⁸⁵ CityFibre response to the April 2017 DPA Consultation, page 44.

⁵⁸⁶ Openreach response to the April 2017 DPA Consultation, page 52.

⁵⁸⁷ CityFibre response to the April 2017 DPA Consultation, page 45.

⁵⁸⁸ Openreach response to the April 2017 DPA Consultation, page 51.

Our reasoning and decisions

Survey requirements

Field surveys

- 6.89 We continue to consider that telecoms providers intending to use PIA to deploy large scale networks are likely to find it necessary to undertake field surveys as part of their planning process. This is because a survey allows a telecoms provider to visually inspect Openreach's infrastructure as part of its overall network planning process. Accordingly, a telecoms provider will be able to verify plans based on Openreach's network records only and modify its plans as a result of inaccuracies in Openreach's network records. In addition, a survey will allow a telecoms provider to capture additional information relevant to its network deployment plans that is not held in Openreach's records (such as the amount of spare capacity in joint boxes, manholes and information relevant to using poles).
- 6.90 Notwithstanding this, our view is that the choice of whether to undertake a survey, and the extent of that survey, should be based on the telecoms provider's own judgement (including assessing the risks of not undertaking a survey prior to ordering PIA).
- 6.91 We have therefore decided to maintain the existing requirement in the PIA Reference Offer to include:
- procedures for the provision of information to telecoms providers about spare capacity, including arrangements for visual surveys of Physical Infrastructure to determine spare capacity.
 - conditions for the inspection of the Physical Infrastructure at which access is available or at which access has been refused on grounds of lack of capacity.

Using field survey information to enhance Openreach's records

- 6.92 We acknowledge that there are likely to be a set of issues relating to using survey information provided by telecoms providers to improve Openreach's network records. These include practical details such as the type of information that is recorded, the format of that information and how accuracy of any information is assured. Nevertheless, we consider that there would be mutual benefits to Openreach and telecoms providers from having better quality information regarding Openreach's physical infrastructure. In light of this, we have decided not to impose a regulatory obligation and instead suggest that Openreach and industry consider such arrangements as part of the new PIA Reference Offer discussions.

Responsibility for pole surveys

- 6.93 Around 50% of UK premises are connected to the local access network from poles via overhead lead-ins in the form of dropwires. Therefore, poles are an important component of Openreach's physical infrastructure. Given this, we consider that it is imperative that telecoms providers are able to effectively and efficiently access poles.
- 6.94 In light of the above, we have decided that the PIA Reference Offer requirement outlined earlier, should apply to poles:

- procedures for the provision of information to telecoms providers about spare capacity, including arrangements for visual surveys of Physical Infrastructure to determine spare capacity.
 - conditions for the inspection of the Physical Infrastructure at which access is available or at which access has been refused on grounds of lack of capacity.
- 6.95 While Openreach's network records contain information about the location and size of poles they do not currently include all the relevant information that telecoms provider will require to determine whether poles can be used to deploy their networks. The factors that determine whether a pole can be used for a telecoms provider's network are more complex than those associated with using Openreach's duct infrastructure and include:
- Location of the pole.
 - Safety assessment relating to whether and how the pole can be accessed (e.g. whether it can be climbed via a ladder or whether it needs to be accessed via a raised platform).
 - Whether the pole is defective in some way that prevents additional equipment being installed.
 - Whether the pole has a steel ringhead that can be used to attach dropwires (or aerial cables).
 - Whether the pole is capacity constrained. This will depend on the load bearing capacity of the pole which itself will depend on both the weight of additional equipment and the radial distribution of cables that are attached to the pole (for example, dropwires to the customer premises). For example, attaching additional cables to a pole may unbalance the pole.
- 6.96 Our view is that a field survey of a pole is likely to be required as part of a telecoms provider's planning activities (and subsequent network deployment activities) to ascertain whether a pole is ready for use (including whether it can accommodate the telecoms provider's equipment on the pole and cables).
- 6.97 Under the current PIA product and process, accredited and trained operatives of other telecoms providers can undertake the survey of a pole, including assessing its safety and available capacity to attach equipment at the top of a pole and cables (where those cables fall within a set of technical parameters) without intervention from Openreach. Our understanding is that dropwires would generally fall within the technical parameters.
- 6.98 It is likely that telecoms providers will use poles primarily for dropwire attachments. Therefore, under current arrangements they would not require Openreach assistance in most cases.
- 6.99 Where the type of cable to be attached to a pole falls outside the technical specifications set by Openreach, Openreach currently stipulates that it undertakes a joint survey of the pole to assess whether the pole can take the load. Our understanding is that aerial cables (which are typically larger, heavier and with a higher breaking strain than dropwires) are

likely to fall into this category. Openreach has explained that surveying poles for the purposes of installing these types of cables requires more specialist training.⁵⁸⁹

- 6.100 We acknowledge that surveying poles for heavier cables (e.g. aerial cables) may be more specialised than that associated with lighter cables (that have a lower breaking strain). However, we consider that the engineering, safety and operational rules relevant to such surveys could be documented and training developed so that telecoms providers could be accredited to undertake all aspects of pole surveys without Openreach intervention.
- 6.101 Our view is that the details relevant to allowing accredited PIA telecoms providers to undertake all aspects of pole surveys is something that could be explored further as part of industry discussions between Openreach and telecoms providers as part of the new PIA Reference Offer discussions.

Other planning requirements

- 6.102 We have decided that the PIA Reference Offer includes:
- technical specifications for PIA including:
 - technical specifications for permitted cables and associated equipment; and
 - cable installation, attachment and recovery methods.
 - the methodology for calculating availability of spare capacity in Physical Infrastructure.
 - conditions for reserving capacity that shall apply equally to BT and telecoms providers.
- 6.103 We consider these conditions will need to be known by a telecoms provider planning to use PIA to deploy a network as it will have a bearing on the design and deployment of that network.

Operational processes

Our proposals

Ordering

- 6.104 In our April 2017 DPA Consultation, we identified a need to improve the operational processes for capacity reservation to make them suitable for large scale network deployment. We considered that while the current process may be appropriate for small scale network deployments (where reservation requests are limited to a small number of assets), for large scale networks the ordering process would be too labour intensive for both Openreach (to assess and approve an order) and other telecoms providers, therefore impeding the effectiveness of the PIA remedy. We noted that this was particularly important since Openreach does not use PIA itself and is therefore not subject to the inefficiencies that telecoms providers face relating to the current ordering process.

⁵⁸⁹ Openreach response to the April 2017 DPA Consultation, page 51.

- 6.105 Our view was that telecoms providers should be able to order PIA in a digital format in an efficient manner without heavy reliance on manual processes. We considered that one way this could be achieved would be through telecoms providers being able to order PIA directly from their own GIS planning tools.⁵⁹⁰
- 6.106 We noted that Openreach had indicated that planned changes to its systems will allow for more automated completion of order forms.⁵⁹¹ Given this, we did not propose to impose an obligation on BT prescribing the specific systems that Openreach should develop to support this aspect of the PIA remedy. However, we recognised that the details around how Openreach's solution will work, the timescales by which this functionality will be offered, and the effectiveness of the solution, were unclear. Therefore, we indicated that if BT failed to promptly implement the changes it has put forward, we would consider imposing requirements on BT around this process.

Requests for additional infrastructure capacity

- 6.107 In the April 2017 DPA Consultation, we proposed that the PIA network access obligation should include a requirement for Openreach to make adjustments to its infrastructure to relieve congestion, either by repairing faulty infrastructure or providing additional capacity.
- 6.108 In light of our proposal, we considered that it is important there is transparency around the process for requesting additional capacity, including the information a telecoms provider must provide when requesting additional capacity. Therefore, we proposed that the PIA Reference Offer should be required to include:
- arrangements for relieving congested Physical Infrastructure, including the repair of existing faulty infrastructure and the construction of new Physical Infrastructure; and
 - the information that a Third Party is required to provide to BT where that Third Party is requesting the repair of existing faulty infrastructure and/or the construction of new Physical Infrastructure.

Arrangements to provide information to support PIA orders where these include requests for additional capacity

- 6.109 In our April 2017 DPA Consultation, we considered that where a telecoms provider requests a network adjustment because of a lack of capacity (and in light of our proposals relating to BT's network access obligation and cost recovery), it was reasonable for a telecoms provider to provide supporting information to Openreach to allow Openreach to respond to this request.
- 6.110 We considered that it may be more efficient for telecoms providers to gather the necessary information (as specified by Openreach) during their field survey activities rather than for Openreach to undertake field surveys after receipt of reservation requests. However, we recognised that Openreach may wish to undertake field surveys in some

⁵⁹⁰ As noted above, we commissioned Mott MacDonald to develop a systems specification with features that could support the use of PIA for large scale network deployments.

⁵⁹¹ Openreach response to the 2016 PIA Consultation, page 31.

circumstances, for example to satisfy itself that the most cost-effective solution is adopted. We therefore considered that these aspects of the process are best progressed by Openreach in discussion with telecoms providers in the first instance.

- 6.111 However, our view was that the information provided via Openreach's network records relating to expected available capacity should help guide the level of information that will need to be provided. For example, where Openreach's network records already indicate that there is insufficient capacity to deploy an additional 25mm sub-duct, there could be minimal requirements for the telecoms provider to provide information to support its request for additional capacity (possibly photographic evidence only).
- 6.112 In our April 2017 DPA Consultation, we identified two points in the stages of deploying a network using PIA where adjustments to poles could be needed:
- i) Where the pole is not ready for use either because it cannot be climbed; does not have a ringhead; or any other reason that prevents a telecoms provider from being able to install its equipment (e.g. connector box) on the pole in anticipation of future connections; and/or
 - ii) Where there are capacity constraints in relation to installing additional dropwires (which we discussed further as part of our proposals in relation to 'connecting the customer').
- 6.113 In relation to requests for adjustments as a result of (i), we considered that Openreach's own engineering rules and processes for checking poles should be a key driver of the type of information that a telecoms provider should provide where it requires an adjustment to a pole for reasons of safety and accessibility.

Service Level Agreements and Service Level Guarantees

- 6.114 We considered that it was important that Openreach responds to requests to relieve congested infrastructure in a known and reasonable timescale. Consequently, we proposed that the PIA Reference Offer includes:
- Service Level Commitments and Service Level Guarantees in relation to the timescales for BT to respond to a request by a Third Party to relieve congested Physical Infrastructure other than a congested Pole, where such a response confirms that the order has been accepted and includes how BT proposes to relieve that congestion.
- 6.115 Our view was that Openreach and telecoms providers were well placed to take forward the detailed development of these proposals. However, we offered the following considerations that could act to guide future industry discussions.
- We considered that Openreach should confirm that a telecoms provider's order has been accepted (that is, it includes all the necessary information to be assessed by Openreach) within a matter of days.
 - We recognised that the timescales needed for Openreach to assess and provide a response to an order (i.e. whether it has been approved; an alternative route is offered; or reasons for rejection) would be dependent on the size and complexity of

that request. Our view was that the response times specified in the current PIA Reference Offer where Openreach aims to approve orders related to a route within five days; and to approve orders for an exchange area within 20 days, appear to be broadly reasonable and should be a starting point for industry discussions.

Stakeholder responses

- 6.116 Openreach said that it had made significant progress in developing a more efficient ordering process and had addressed all major concerns identified relating to operational systems through the launch of its new PIA Digital Map Tool. Openreach referred to two developments:
- The click and select functionality of the PIA Digital Map Tool, introduced in May 2017, that enables telecoms providers to download infrastructure information into PIA order forms.
 - The web services functionality, introduced in March 2017, that allows telecoms providers to develop software interfaces to import Openreach infrastructure information into their own planning tools. Telecoms providers could also develop software to export order information from their planning tools into Openreach order forms.⁵⁹²
- 6.117 Openreach also referred to planned developments of its Next Generation Workflow Management Tool which would provide automation of order flows including acknowledgements and customer updates on order progress.⁵⁹³
- 6.118 Openreach welcomed Ofcom’s proposal that further developments could be taken forward by industry and Openreach through the Passive Industry Working Group.⁵⁹⁴
- 6.119 TalkTalk argued that Ofcom should include a requirement for better ordering processes as part of the PIA Reference Offer rather than rely on Openreach to deliver improvements independently.⁵⁹⁵ Flomatik recommended that Openreach is required to set out a roadmap of systems developments as part of the PIA Reference Offer.⁵⁹⁶

Requests for additional infrastructure capacity

- 6.120 Openreach explained that under Ofcom’s proposals, where Openreach would choose if and how capacity should be provided (following a request from a telecoms provider) the existing PIA product and its associated processes would need to be amended significantly.⁵⁹⁷

⁵⁹² Openreach response to the April 2017 DPA Consultation, page 52.

⁵⁹³ Openreach response to the April 2017 DPA Consultation, page 80.

⁵⁹⁴ Openreach response to the April 2017 DPA Consultation, pages 53.

⁵⁹⁵ TalkTalk response to the April 2017 DPA Consultation, page 11.

⁵⁹⁶ Flomatik response to the April DPA Consultation, page 6.

⁵⁹⁷ Openreach response to the April 2017 DPA Consultation, page 54.

- 6.121 Openreach noted that capacity information in the PIA Digital Map Tool is an indicative estimate only. Therefore, it considered that in circumstances where a duct section is tagged as red on its PIA Digital Map Tool, using this information only as a basis for requesting additional capacity could generate unnecessary surveys and additional costs for Openreach.⁵⁹⁸
- 6.122 CityFibre suggested that where unanticipated additional adjustments arise as a result of gaps in Openreach's records, it seems unfair to punish the telecoms provider by putting the request to the back of the queue (i.e. behind other orders awaiting assessment and approval by Openreach). Instead, it suggested the request should go into a separate, fast-tracked resolution process to arrive at a view of how quickly the works can be undertaken within Openreach's workflow.⁵⁹⁹

Service Level Agreements and Service Level Guarantees

- 6.123 Openreach did not support the introduction of SLAs for orders for additional infrastructure capacity, other than for order receipt confirmation. It also considered that the 5 and 20 day timescales would not form a reasonable basis for an order evaluation SLA. Order evaluation timescales would be dictated by the size of the order, the range of details that would need to be reviewed and, where relevant, field survey timescales. Openreach would need to assess timescales for infrastructure ordering as part of the Reference Offer development process. Its initial view was that a large range of timescales would be required given the unique nature of each type of infrastructure order.⁶⁰⁰
- 6.124 CityFibre's view was that 1-2 days to validate a route order; and no longer than 10 days to validate an area order should be possible.⁶⁰¹
- 6.125 The PAG suggested that the quantum of SLGs (in relation to those proposed by Ofcom across all stages of the PIA process) should be set with reference to those set in other countries where passive infrastructure remedies have been successful.⁶⁰²

Our reasoning and decisions

Ordering

- 6.126 We consider that telecoms providers should be able to order PIA in a digital format in an efficient manner without heavy reliance on manual processes. This is particularly important since, unlike other telecoms providers, Openreach itself does not consume PIA for its own network deployments and therefore does not order PIA.
- 6.127 In our April 2017 DPA Consultation, we suggested that one approach would be to allow telecoms providers to order PIA by submitting information directly from their own GIS

⁵⁹⁸ Openreach response to the April 2017 DPA Consultation, page 55.

⁵⁹⁹ CityFibre response to the April 2017 DPA Consultation, page 46.

⁶⁰⁰ Openreach response to the April 2017 DPA Consultation, pages 54 to 56.

⁶⁰¹ CityFibre response to the April 2017 DPA Consultation, page 45.

⁶⁰² The PAG response to the April 2017 DPA Consultation, page 27.

systems. To inform our views we also commissioned Mott MacDonald to produce a systems requirements specification that illustrated how such a system might work and the broad timescales and costs for implementing such a system.

- 6.128 The Mott MacDonald report specifies requirements for a system with features that could support the use of PIA for large scale network deployments. We acknowledge that alternative systems specifications could be designed that could also provide PIA users with effective and efficient solutions for the various interactions between Openreach and PIA users as part of the customer journey between ordering PIA and deploying a network. We also recognise that such a system would need to fit within a suite of other systems. Accordingly, Openreach may approach and design its systems differently to that outlined in Mott MacDonald’s systems specification.
- 6.129 Since our April 2017 DPA Consultation, Openreach has deployed systems that allow telecoms providers to download information from the PIA Digital Map Tool into a table for inclusion in their PIA order form.
- 6.130 We also note that Openreach is planning to make further improvements to the systems that support PIA more generally. It has provided information relating to the following planned improvements to its systems:
- improvements to the billing system;
 - a development that allows reserved poles to be highlighted in the PIA Digital Map Tool;
 - a development (phased in two parts) that allows telecoms providers to submit information about changes to their deployment plans (e.g. amend orders) and Openreach to provide feedback to telecoms providers around the progress of an order.⁶⁰³
- 6.131 Notwithstanding the above, our view is that further developments are likely to be required to ordering systems (and systems more generally) for PIA to be used for large scale network deployment. We welcome the functionality that allows telecoms providers to download information from the PIA Digital Map Tool into a table for inclusion in their PIA order form, since this reduces the reliance of manually inputting all information into an order form. However, even with this functionality, telecoms providers will need to edit the information to specify the items that they want to order.
- 6.132 Our view is that telecoms providers should be able to export information from their own GIS planning tools into Openreach systems which specifies their PIA order. We acknowledge that telecoms providers could develop interfaces from their own GIS planning tools to populate Openreach’s current ordering forms. However, this may not be an efficient solution for large scale network deployment.
- 6.133 We also note that where a telecoms provider requests a network adjustment, Openreach is likely to require it to submit information to support the assessment of the request. The

⁶⁰³ Openreach response to question 26 of the WLA s.135 notice issued on 12 October 2017.

information that is required by Openreach is likely to affect the design of any system or interface into that system.

- 6.134 Clearly, part of the responsibility for improving the exchange of information is likely to fall to telecoms providers as they will need to develop their systems to exchange information with Openreach's in an agreed format. As such, telecoms providers will need to give their views about the types of interface they want from Openreach to support their own use of PIA.
- 6.135 Our view is that future systems developments should be identified and progressed as part of discussions at the PIWG that is chaired by the OTA2. We intend to carefully monitor the progress being made around future systems developments for PIA.

Requests for additional infrastructure capacity

- 6.136 In Section 2, we provide our conclusions around the scope of the PIA network access obligation. We explain that our remedy includes a requirement on Openreach to make adjustments to its network where this is necessary for its physical infrastructure network to be available to telecoms providers for the purpose of deploying their own networks.
- 6.137 In light of these conclusions, we consider that it is important there is transparency around the process for requesting additional capacity. Therefore, we have decided on a requirement in the PIA Reference Offer to include:
- arrangements for relieving congested Physical Infrastructure, including the repair of existing faulty infrastructure and the construction of new Physical Infrastructure; and
 - the information that a telecoms provider is required to provide to BT where that telecoms provider is requesting the repair of existing faulty infrastructure and/or the construction of new Physical Infrastructure necessary for SLAs and SLGs.
- 6.138 We acknowledge Openreach's comment that the existing PIA product and process will need to be amended to allow Openreach to be able to respond to requests from a telecoms provider for additional capacity. We provide our conclusions on the implementation timescales in Section 7.

Arrangements to provide information to support PIA orders where these include requests for additional capacity

- 6.139 We consider that it is reasonable for telecoms providers to provide supporting information to Openreach to allow Openreach to respond to requests for additional capacity (either new build or enabling works).
- 6.140 We consider that it may be more efficient for telecoms providers to gather the necessary information during their field survey activities, rather than for Openreach to undertake field surveys after receipt of reservation requests. However, we recognise that Openreach may wish to undertake field surveys in some circumstances, for example to assess whether an alternative option still using BT's physical infrastructure may exist which would enable the telecoms provider to deploy its access network without an adjustment to the physical infrastructure being made.

- 6.141 Our view is that the type of information that a telecoms provider should provide where an adjustment is required should be guided by the information that Openreach requires, records and uses itself when making network adjustments in similar circumstances.
- 6.142 Notwithstanding this, we consider that this is best progressed by Openreach in discussion with telecoms providers in the first instance as part of the discussions on the detailed arrangements relating to the information that a telecoms provider is required to provide to BT where that telecoms provider is requesting the repair of existing faulty infrastructure and/or the construction of new Physical Infrastructure.
- 6.143 We acknowledge the concerns raised by Openreach and accept that requesting additional infrastructure on the basis of information from network records alone could give rise to unnecessary requests since, where available, this information is an estimate of available capacity only. Our view is that that although information from the PIA Digital Map Tool could play a role in determining the type and level of evidence provided to Openreach, the detailed arrangements should be taken forward by Openreach and industry in the first instance.⁶⁰⁴
- 6.144 With regards to CityFibre’s concerns about unanticipated adjustment requests that arise during network deployment. Our comments in the April 2017 DPA Consultation were not intended to imply that such requests might be put to the back of a work queue by Openreach. We simply noted that Openreach would need an opportunity to assess such requests. Minimising the incidence of unanticipated adjustment requests, and any attendant delays, is one of the main reasons why we think telecoms providers will have a strong incentive to undertake field surveys prior to network deployment.⁶⁰⁵

Information to support orders where these include adjustments to pole infrastructure

- 6.145 Earlier in this section, we provided our conclusions relating to accredited telecoms providers having the opportunity to undertake all aspects of pole surveys.
- 6.146 Our view is that the type of information that a telecoms provider should provide where an adjustment is required to a pole should be guided by the information that Openreach requires, records and uses itself when making network adjustments in similar circumstances.
- 6.147 Again, our view is that the practical arrangements should be agreed as part of discussions relating to the PIA Reference Offer.

⁶⁰⁴ As part of its response to the April 2017 DPA Consultation (Openreach response to the April 2017 DPA Consultation, page 31) Openreach raised concerns about the scope of the network access requirement more generally. This included concerns around the financial exposure the proposed requirement places on Openreach and the risk of moral hazard. Openreach suggested that as part of its assessment relating to requests for additional capacity it would need to consider commitments by telecoms providers to occupy the built infrastructure for the long-term (potentially with held-to-term or termination charges for early exit). We consider issues relating to the potential adverse effects of the PIA remedy in Section 4.

⁶⁰⁵ Notwithstanding this, we recognise that some requests for network adjustments, particularly those relating to enabling works, may not be known until the telecoms provider installs its network.

Service Level Agreements and Service Level Guarantees

- 6.148 An order for PIA consists of a request to access parts of Openreach's physical infrastructure.
- 6.149 An order could comprise a simple request to rent space in or on Openreach's physical infrastructure, or alternatively it could comprise a request to rent space along with a request for network adjustments needed for accessing the physical infrastructure.
- 6.150 On receiving an order for PIA, Openreach will need time to assess whether PIA orders fall within BT's network access obligation. Our view is that telecoms providers should have certainty about the timescales for Openreach to respond all types of order.
- 6.151 Our view is that where an order comprises a simple request to rent space in or on Openreach's physical infrastructure, the timescales needed for Openreach to respond to an order should be relatively short.
- 6.152 We recognise that where an order includes a request for network adjustments Openreach may need more time to consider the order. For example, where a network adjustment is requested for additional capacity, Openreach will need to consider how that is provided.
- 6.153 Our view is that following the completion of its assessment of an order, Openreach should be able to provide one the following responses to the telecoms provider's order:
- Approval of the order, including (if needed) information of how additional capacity will be provided;
 - Offer of an alternative route for consideration by the telecoms provider (where this includes a request for additional capacity);
 - Rejection of the order or part of the order and reasons for rejection.
- 6.154 We continue to consider that SLAs and SLGs are needed in relation to the timescales for Openreach to respond to a telecoms provider's order to use PIA (including where network adjustments are included within that order). This is because delays will have a detrimental impact of a telecoms provider's network deployment plans. We have therefore, decided that the PIA Reference Offer should include:
- Service Level Commitments and Service Level Guarantees in relation to the timescales for BT to respond to a request by a telecoms provider for PIA including where relevant to relieve congested Physical Infrastructure other than a congested Pole, where such a response confirms that the order has been accepted and includes how BT proposes to relieve that congestion.
- 6.155 We consider that there are two points in the ordering and validation process where SLAs/SLGs will need to be established:
- i) Openreach's confirmation that the telecoms provider's order has been accepted (that is, it includes all the necessary information for it to be assessed by Openreach).
 - ii) Openreach's response to the order from the telecoms provider.

- 6.156 We acknowledge Openreach’s comment that it will need to consider a range of details relating to an order as part of its validation and approval process (and these details may be case specific in nature). We also acknowledge that the timescales needed for Openreach to assess and provide a response to an order may be dependent on the size and complexity of that request. Nevertheless, we consider that such details can be accommodated within the design of the SLA and SLG regime.
- 6.157 We consider that the details of the SLA and SLG regime are best progressed through discussions between Openreach and industry as part of the development of the PIA Reference Offer.
- 6.158 Notwithstanding the above, we remain of the view that the timescales we suggested in our April 2017 DPA Consultation are a reasonable starting point for discussions. These are as follows:
- Openreach should confirm that a telecoms provider’s order has been accepted (i.e. that it includes the necessary information to be assessed by Openreach) within a matter of days.
 - Openreach should approve orders related to a route within five days;
 - Openreach should approve orders for a local access area within 20 days.

Network deployment

- 6.159 For telecoms providers currently using PIA, the network deployment stage is broadly comprised of the following activities and processes:
- Build works: where Openreach is requested to install new capacity as part of the telecoms provider’s PIA order, Openreach will instruct its contractors to fulfil this request.
 - Installation: following approval of the PIA order (and completion of any build works), the telecoms provider proceeds with the installation of its access network. From this point in time, Openreach allows the telecoms provider up to six months to deploy its network in the infrastructure that has been reserved.⁶⁰⁶
 - Enabling works: where blocked ducts are encountered during network deployment, the telecoms provider has several choices as it can: request Openreach to carry out the required enabling works to clear the blockage(s); or clear the blockage itself; or seek an alternative route to avoid the blockage.
 - Completion notification: once the telecoms provider has completed its access network deployment, it notifies Openreach and provides details of any deviations from its original plan (as set out in the PIA order) so that Openreach may amend its records.
- 6.160 In the following sub-section, we first set out our proposals, stakeholders responses and our reasoning and decisions relating to build works. We then set out our proposals,

⁶⁰⁶ When working on BT’s infrastructure, BT currently requires that telecoms providers notify Openreach of their operatives’ whereabouts three days in advance. This allows Openreach to coordinate its own operatives and to provide a record for both the telecoms provider and Openreach should any damage or highway breach occur.

stakeholders responses and our reasoning and decisions relating to the remaining activities relevant to network deployment.

Our proposals

6.161 In our April 2017 DPA Consultation, we considered that for PIA to be used at scale it is essential that telecoms providers have greater certainty about the timescales for network deployment when using BT's duct and pole infrastructure. This is so that they are able to install their networks in a timely manner, without undue delays. This includes having confidence regarding the timescales to undertake and complete build and enabling works.

Build works

6.162 We considered that where a telecoms provider has an order for PIA that includes a request for additional capacity, it will not be able to fully deploy its network (and generally be unable to offer services) until the additional capacity is provided and the infrastructure is 'ready for use'. We considered that this had the following implications:

- For duct infrastructure, we expected that Openreach would complete any build works that are required under the network access obligation prior to charging rental for any part of an order.
- For pole infrastructure, we expected that Openreach, where it is required under the access obligation, would need to:
 - Ensure that a pole is safe and can be climbed by a telecoms provider. Where a pole does not meet this requirement, it should be replaced or repaired.
 - Install a 'steel ringhead' on a pole which does not have one.
 - Ensure that a pole has space for a telecoms provider's connection box or other apparatus, to be installed.

6.163 We proposed to incentivise Openreach to complete build works in reasonable timescales and with more certainty for telecoms providers in two ways:

- Through the introduction of SLAs and SLGs.
- Through a pricing mechanism and, in particular, in relation to when Openreach is able to commence rental charges where there is incomplete build works as part of an order.

SLAs and SLGs for build works

6.164 In the April 2017 DPA Consultation, we proposed that the PIA Reference Offer should be required to include:

- Service Level Commitments and Service Level Guarantees in relation to the timescales for completion by BT of any works necessary to relieve congested Physical Infrastructure other than a congested Pole.

6.165 We considered that the more detailed development of an appropriate SLA and SLG regime for build works should be taken forward by Openreach and telecoms providers. However, while we did not propose to prescribe the details of an SLA and SLG regime, our view was

that the expected timescales for completing build works under PIA should be in line with the completion of build works where these are required by Openreach itself, for the purposes of deploying its own fibre broadband services. This approach would be consistent with our proposed requirement for non-discrimination.

Commencement of rental charges for PIA

- 6.166 In our April 2017 DPA Consultation, we considered that where a telecoms provider places an order for PIA that includes a requirement to build additional capacity, it will not generally be able to fully deploy its network (and therefore offer services over that network) until the additional capacity is provided.
- 6.167 Therefore, we proposed that where Openreach is responsible for completing build works, it should only be able to commence charging rental for using its physical infrastructure relating to any part of a single PIA order when all build works is completed for that order. This included making poles ready for use (i.e. the telecoms provider incurs rental charges for the infrastructure from when that infrastructure is 'ready for use' to deploy its network).
- 6.168 We considered that a limit would need to be set in relation to the size of an order since absent such a limit, a telecoms provider could place a single PIA order (including a request for build works) over a significant geographic area comprising several regions. As such, any uncompleted build works in one region may have little bearing on a telecoms provider's ability to deploy a network in other regions where it can start offering services and earning revenues without incurring any PIA rental charges for the use of the physical infrastructure.
- 6.169 Our view was that telecoms providers are likely to plan their deployments in areas broadly corresponding to the size of an Optical Local Exchange area. Therefore, we suggested that the requirement is bounded by orders up to an area served by an Optical Local Exchange. However, we said that we would give this further consideration as part of our work for the August 2017 DPA Consultation.
- 6.170 In the August 2017 DPA Consultation, while we considered that the broad policy position set out in the April 2017 DPA Consultation remained appropriate, we also recognised that there may be circumstances, for example when a telecoms provider makes arrangements with Openreach to undertake build works themselves (i.e. self-provision), where alternative arrangements would need to be agreed around the commencement of rental charges. Consequently, we did not consider that it was appropriate to impose a strict requirement on Openreach, in all circumstances, to commence rental charges relating to any part of an order for an area served by an Optical Local Exchange only when all build works for that order are complete. We considered that it would be appropriate for Openreach and industry to work together to agree the specific requirements relating to the commencement of rental charges to be included in the new PIA Reference Offer.

Self-provision for build works

- 6.171 We considered that allowing telecoms providers the opportunity to complete build works themselves (following approval by Openreach as part of an ordering and validation process) could give them greater control and certainty around the timescales for completion. Therefore, we proposed that the PIA Reference Offer includes:
- conditions on which Third Parties may elect to undertake build works on behalf of BT.
- 6.172 We acknowledged that implementing a self-provision model for build works would require a set of practical issues to be resolved. Our understanding was that Openreach sub-contracts most build works to civil engineering contractors. We therefore considered that a self-provision model could be based on these current arrangements, with Openreach allowing telecoms providers to undertake build works on similar terms (including prices) to the terms Openreach puts in place with its own civil engineering contractors.
- 6.173 Our view was that Openreach and telecoms providers were well placed to take forward the detailed development of this proposal.

Stakeholder responses

Build works

- 6.174 Openreach argued that there should be no requirement to make a pole ‘climbable’. It explained that Openreach has many poles which are not climbable but are safe to use (e.g. when accessed by an elevating platform). Accordingly, although both Openreach and PIA telecoms providers may need to access such poles using specialist equipment (e.g. elevating platforms), such poles may have the required capacity and can be ‘usable’ with the correct equipment.⁶⁰⁷

Commencement of rental charges for PIA

- 6.175 Openreach considered that it would be inappropriate to impose a strict requirement on Openreach, in all circumstances, to commence rental charging relating to any part of an order for an area served by an Optical Local Exchange (OLE) only when all build works for that order are complete. It suggested a pragmatic approach would be to allow charging to commence once routes of a certain length (or a defined area) are completed and usable by the PIA customer. It considered that the details should be progressed as part of discussions with industry relating to the new PIA Reference Offer.⁶⁰⁸
- 6.176 CityFibre considered that it was acceptable, in principle, for Openreach and industry to develop rules for the commencement of rental charges. However, it also considered that Ofcom needed to provide some guidance on this issue. It suggested that this guidance should set out that rental charges should not commence until all network adjustment are

⁶⁰⁷ Openreach response to the April 2017 DPA Consultation, page 55.

⁶⁰⁸ Openreach response to the August 2017 DPA Consultation, page 20.

complete (unless in exceptional circumstances); and that where a telecoms provider performs the work, a timeframe should be agreed for the completion of the work, after which rental charges commence (unless the telecoms provider can provide evidence that delays were outside of its direct control).⁶⁰⁹

- 6.177 TalkTalk considered that the commencement of rental charges should be deferred until the completion of network adjustments in the specified local exchange.⁶¹⁰

SLAs and SLGs for build works

- 6.178 Openreach argued that SLA/SLGs are neither objectively justifiable nor proportionate. It considered that if engineering certainties are of critical importance to telecoms providers then it would be reasonable to expect telecoms providers to make their own contractual arrangements. Openreach noted that in relation to completing build works, it will not have full control of all factors affecting the job and that a regime will need to recognise the complexities/categorisations of jobs and associated ‘clock stopping’ events and mechanisms to capture relevant exceptions.⁶¹¹
- 6.179 Openreach noted that SLAs/SLGs on build completion would need to be backed off with its contractors. It argued that one of the inevitable consequences would be higher prices.⁶¹²
- 6.180 CityFibre agreed that the detail of the SLA and SLG regime should be taken forward by industry, but reiterated its early comments relating to the importance of the timescales for approving (or rejecting) a request for build works.⁶¹³

Self-provision for build works

- 6.181 Openreach considered that the practical issues relating to self-provision of build works by other telecoms providers are too complex to overcome efficiently and therefore did not support the proposal (regardless of who funds the build works).⁶¹⁴
- 6.182 [3<] suggested that self-build for build works should be the exception. It would expect that any telecoms provider’s self-provisioned work (either build or enabling) that could cause service disruption to another telecoms provider must utilise the Planned Engineering Works notifications as used by Openreach.⁶¹⁵

Our reasoning and decisions

Build works

- 6.183 In Section 2, we set out our conclusions relating to the scope of Openreach’s network access obligation, including a requirement to make necessary adjustments to its physical

⁶⁰⁹ CityFibre response to the August 2017 DPA Consultation, page 22.

⁶¹⁰ TalkTalk response to the August 2017 DPA Consultation, page 8.

⁶¹¹ Openreach response to the April 2017 DPA Consultation, page 57 to 58.

⁶¹² Openreach response to the April 2017 DPA Consultation, page 38.

⁶¹³ CityFibre response to the April 2017 DPA Consultation, page 47.

⁶¹⁴ Openreach response to the April 2017 DPA Consultation, page 58.

⁶¹⁵ [3<]

infrastructure for the purposes of relieving congestion. This includes a requirement to build additional capacity in certain circumstances.

- 6.184 We maintain our position from the April 2017 DPA Consultation that a telecoms provider using PIA that places an order for PIA which includes a request for additional capacity, will not be able to fully deploy its network (and generally be unable to offer services) until the additional capacity is provided and the infrastructure is 'ready for use'.
- 6.185 Our view is that greater timeliness and certainty of timescales for the delivery of build works are needed for PIA to be used to support large scale network deployment. We intend to provide greater certainty to telecoms providers on the timescales for build works being completed in the following ways:
- Through Openreach having the right incentives to deliver build works in reasonable and certain timescales; and
 - By offering telecoms providers the opportunity to undertake the build works themselves and thereby allowing the telecoms provider to determine the timescales for delivery of that work (i.e. self-provision approach).
- 6.186 We consider that our main focus should be to set the right incentives for Openreach to deliver build works as part of its network access obligation in a timely fashion. There are a number of benefits to Openreach completing planned build works on its own infrastructure. These include:
- Openreach has sight of all planned build requirements relating to its infrastructure, both from telecoms providers under PIA and its own requirements. It is therefore able to coordinate the completion of all build works on its infrastructure which has potential efficiency benefits (in terms of lowering the costs of total build works).
 - Openreach is more likely than other telecoms providers to have existing wayleave agreements in place and is therefore less likely to face delays in completing build works in cases where wayleaves need to be agreed.
 - Certain adjustments to Openreach's infrastructure can only be performed by Openreach. These currently include the installation of footway boxes and where an existing pole needs to be replaced. While we consider that a self-provisioning approach for build works could deliver benefits, we also recognise that a number of practical arrangements will need to be agreed. In the event that Openreach retains sole responsibility for build works relating to specific activities on its physical infrastructure, even if another telecoms provider wants to make use of a self-provision model for other build works, the practical difficulties of coordinating engineering works between another telecoms provider and Openreach are likely to reduce the advantages of a self-provision model significantly.
- 6.187 We have decided to focus on incentivising Openreach to complete build works in reasonable timescales and with more certainty for telecoms providers in two ways (which we set out further below):
- Through a pricing mechanism and, in particular, the point from when Openreach is able to commence rental charges.

- Through the introduction of SLAs and SLGs.

Commencement of rental charges for PIA

- 6.188 We consider that where a telecoms provider places an order for PIA that includes a request for additional capacity and build works, it will not generally be able to fully deploy its network and therefore offer its customers services, until the network adjustments relevant to that request are completed.
- 6.189 Therefore, our general view is that where uncompleted build works prevent a telecoms provider from offering services it is potentially unreasonable for Openreach to commence charging PIA rentals for the use of its physical infrastructure relevant to other parts of that order.
- 6.190 Notwithstanding the above, we also recognise that depending on the size and characteristics of an order, there are likely to be circumstances where uncompleted network adjustments relevant to some parts of an order are unlikely to prevent the telecoms provider from offering services to some customers.⁶¹⁶
- 6.191 Accordingly, our view is that arrangements need to be established relating to the size and/or characteristics of an order and the commencement of PIA rental charges so that:
- Telecoms providers do not face rental charges for PIA where uncompleted network adjustments (to be completed by Openreach) prevent services being offered to end customers; and
 - Openreach isn't prevented from charging rentals where uncompleted network adjustments (to be completed by Openreach) do not impede a telecoms provider from offering services to its customers (at reasonable scale).
- 6.192 Our view is that industry is best placed to develop arrangements relating to the size and/or characteristics of a PIA order and the commencement of rental charges that strike a reasonable balance between achieving both of the aims above. We consider that these arrangements should be developed as part of industry discussions relevant to the processes for implementing our broader conclusions for the PIA remedy.^{617 618 619}

⁶¹⁶ We also note that some network adjustments requests may arise after an order is placed (such as those relevant to enabling works).

⁶¹⁷ See paragraph 6.3 in this section.

⁶¹⁸ In Section 7, we set out our decision relating to the timetable for implementing the new PIA remedy. In that section, we have decided that the new PIA Reference Offer should be by 1 April 2019. Up until the implementation of the new PIA Reference Offer, Openreach will commence charging PIA rentals under the existing arrangements.

⁶¹⁹ Where a telecoms provider has opted to undertake the network adjustments itself, the timescales to complete the works will be determined by the telecoms provider rather than Openreach. For example, this could be because the telecoms provider has agreed to self-provide the works on behalf of Openreach; or because the telecoms provider is undertaking the works as part of extending or enhancing its own physical infrastructure. Under these circumstances, the completion of network adjustments that prevents the telecoms provider from offering services to its customers could be under the control of the telecoms provider (rather than Openreach). Our view is that in such circumstances, Openreach should not be prevented from charging rentals where it has completed the works it has agreed to complete. We consider that arrangements relevant to such circumstances should be developed as part of industry discussions.

SLAs and SLGs for build works

- 6.193 Given the range of options available to Openreach to overcome unusable sections of infrastructure, it will sometimes be more efficient (i.e. quicker, easier and/or cheaper) for Openreach to adjust the existing physical infrastructure than for a telecoms provider to install their own infrastructure alongside BT's. Consequently, we do not accept Openreach's argument that SLAs and SLGs are not objectively justified because telecoms providers could make their own contractual arrangements.
- 6.194 Our view is that where Openreach is required to undertake build works as part of its network access requirement, these works should be completed in reasonable timescales and with certainty. This is because lengthy timescales to complete network adjustments, and also the lack of certainty over the timescales for completing the build works, will impede telecoms providers' ability to deploy their networks effectively, efficiently and offer services to their customers.
- 6.195 We consider that in the absence of regulation, Openreach would not have sufficient incentives to complete requested build works in a timely manner (or to provide sufficient certainty about timescales).
- 6.196 Our view is that specific conditions relating to SLAs and SLGs for the time to complete planned build works are needed to provide appropriate incentives for Openreach. Therefore, we have decided that the PIA Reference Offer condition should include:
- Service Level Commitments and Service Level Guarantees in relation to the timescales for completion by BT of any works necessary to relieve congested Physical Infrastructure (including the repair of existing faulty infrastructure and the construction of new physical infrastructure) other than a congested Pole.
- 6.197 As Openreach has noted, further work will be required to specify the SLAs and SLGs and we are not therefore able to specify SLAs and SLGs at present. We consider that Openreach and telecoms providers are well placed to take forward the more detailed development of the SLAs and SLGs. However, while we are not prescribing the details of an SLA and SLG regime, we would expect that the timescales for completing build works under PIA should be in line with the completion of build works where these are required by Openreach itself, for the purposes of deploying its own fibre broadband services. This approach would be consistent with our proposed requirement for non-discrimination.
- 6.198 In relation to the design of the SLAs and SLGs, while we acknowledge Openreach's concern that it may not have full control of all factors affecting build works, we note that similar issues arise in relation to the provision of duct for Openreach's active products where SLAs and SLGs are established. We therefore consider that such issues should not be insurmountable and that it should be possible to design SLAs and SLGs that take account of such factors. Similarly, we would expect that the SLAs for build work would be in line with the timescales Openreach already stipulates for the completion of build works for its own projects. Therefore, we do not accept that SLAs and SLGs would inevitably result in higher prices as Openreach has argued.

Self-provision for build works

- 6.199 In its response to our April 2017 DPA Consultation, Openreach considered that the complexities related to facilitating a self-provision model for build works outweighed the benefits and therefore did not support the proposal. In response to our 2016 PIA Consultation, Openreach highlighted some of the practical difficulties associated with such a proposal.
- 6.200 We acknowledge that implementing a self-provision model for build works would require a set of practical issues to be resolved. For example, in its response to our 2016 PIA Consultation, Openreach referred to information flows needed to support the requirement, arrangements for telecoms providers to access Openreach's stores (for Openreach specific or exclusively supplied materials) and health and safety issues.⁶²⁰ However, we also note that Openreach sub-contracts most build works to civil engineering contractors and that a self-provision model for build works in relation to PIA users could be based on similar arrangements to those Openreach puts in place with its own civil engineering contractors.
- 6.201 While we recognise that the detailed arrangements (including pricing) would require industry discussions, we continue to consider that allowing telecoms providers the opportunity to complete build works themselves (following approval by Openreach as part of an ordering and validation process) would mean that a telecoms provider has greater control and certainty around the timescales for completing its own network deployment.
- 6.202 We have decided that the PIA Reference Offer condition should include:
- conditions on which telecoms providers may elect to undertake repair or build works on behalf of BT.
 - technical specifications for PIA, including:
 - technical specifications relevant to undertaking build works
- 6.203 Our view is that Openreach and telecoms providers should look to progress these arrangements as part of developing the new PIA Reference Offer.

Our views on making Openreach's pole infrastructure 'ready for use'

- 6.204 We have reviewed the practical arrangements for making poles ready for use in light of our conclusions about the scope of the network access obligation (as it relates to poles) and Openreach's comments about the way in which defective poles are accessed.
- 6.205 As we discuss in more detail in Section 2, the network access obligation includes an obligation for BT to adjust its physical infrastructure to make it ready for use in certain circumstances. In relation to poles, it is likely to be more efficient for Openreach to provide capacity than for a telecoms provider to build parallel infrastructure. We have therefore

⁶²⁰ Openreach response to the 2016 PIA Consultation, page 41.

concluded that it is likely that two types of adjustment will fall within the scope of the network access obligation:

- Congested poles – adjustments to provide additional capacity where poles cannot be used because they are fully loaded or have insufficient space for a telecoms providers equipment.
- Defective poles - replacement of poles that cannot be used because they are defective.

- 6.206 When considering the practical application of these obligations to pole related build activities in the April 2017 DPA Consultation, we incorrectly characterised poles that cannot be accessed with a ladder (unclimbable poles) as unusable and proposed that Openreach should therefore be required to replace unclimbable poles. As Openreach has pointed out, some of its defective poles can still be used provided they are accessed with an elevating platform and others are always accessed with an elevating platform because of their proximity to safety hazards such as spiked railings.
- 6.207 As only a very small proportion of Openreach's poles are unclimbable, they are unlikely to present a significant barrier to telecoms providers network deployment. Moreover, as Openreach accesses unclimbable poles with elevating platforms, telecoms providers will not be at a competitive disadvantage to Openreach if they also must use elevating platforms. We have therefore concluded that it would not be appropriate for us to require Openreach to replace unclimbable poles.
- 6.208 We have also considered the practical arrangements for the replacement of defective poles in light of the information we have gathered from Openreach. Openreach classifies defective poles according to the nature of their defects. Depending on the defect classification, Openreach may:
- i) allow the pole to continue to be used permanently;
 - ii) allow the pole to continue to be used pending its replacement; or
 - iii) prohibit the addition of any equipment or wires, pending replacement of the pole.
- 6.209 Other than in urgent cases, poles are normally scheduled for replacement during the next two years as part of a programme managed by a contractor.⁶²¹
- 6.210 Telecoms providers would not be able to deploy their networks (e.g. to add a manifold or other equipment) or to add dropwires to connect customers to category iii) poles. As such the pole would be characterised as capacity constrained and therefore, under the network access obligation, BT would be required to replace the pole in response to a request from a telecoms provider. Our view is that Openreach will need to expedite the replacement of category iii) poles, in response to requests from telecoms providers, as the timescales for Openreach's standard replacement programme are such that they would effectively prevent telecoms providers from deploying their networks.

⁶²¹ Openreach response to question 10 of the WLA s.135 notice issued on 12 October 2017.

- 6.211 We also think that category ii) poles would benefit from further discussion at the Passive Infrastructure Working Group. The case for expediting replacement appears less clear cut given the extended timescale for pole replacement. Replacing such poles before telecoms providers deploy their networks would avoid the need for telecoms providers to rearrange their equipment when the poles are replaced. However, it may also increase Openreach's costs as expedited replacement may be more expensive than scheduled replacement and the effective life of the poles would be shortened. In view of the non-discrimination obligations we are imposing, we expect that the arrangements adopted for PIA will be consistent with those that Openreach applies to its own network deployment.⁶²²
- 6.212 The complexities of pole classification underline the need for telecoms providers to have access to information about the condition of Openreach's poles to inform their network planning, network build and ongoing operations. As discussed above, we have concluded that the network records Openreach makes available to telecoms providers should include information about pole classification and pole replacement (in the same way it is available to Openreach).

Our proposals

Installation

- 6.213 In our April 2017 DPA Consultation, we proposed to maintain the existing requirement for the PIA Reference Offer to include:
- conditions for the installation and recovery of cables and associated equipment.

Enabling works

- 6.214 A telecoms provider installing its network using BT's infrastructure may encounter obstacles, such as collapsed or blocked ducts, which could not be determined in advance from a visual survey. In these instances, enabling works on the duct will be required to allow the telecoms provider to progress its network deployment.
- 6.215 In January 2017 Openreach introduced changes to PIA that allowed telecoms providers the opportunity to undertake their own enabling works.⁶²³ Prior to this change, telecoms providers would need to rely on Openreach to intervene in their network deployment process and clear blockages on their behalf.
- 6.216 In our April 2017 DPA Consultation, we considered that for a telecoms provider intending to use PIA for large scale network deployment, the requirements and characteristics relating to enabling works are likely to differ to build works in the following ways:
- the need for enabling works is only likely to be identified during the installation of the network (as opposed to during the planning and survey stage for build works).

⁶²² Openreach has explained that its current operational practice is to replace defective poles for its own deployment of full-fibre. Openreach response to question 13 of the WLA s.135 notice issued on 12 October 2017.

⁶²³ Under the process change telecoms providers are also able to request Openreach to undertake enabling work on their behalf. The telecoms provider is charged a fee by Openreach for the works.

Therefore, unlike requests for additional capacity which are likely to be planned in advance and made when ordering PIA, enabling works cannot be planned for at the ordering stage.

- enabling works are likely to be of a smaller scale and less complex than build works.

6.217 In light of our proposed network access obligation and approach to cost recovery, where enabling works are requested by a PIA user, this would impact Openreach's own cost base. Accordingly, Openreach would need to have a role in the process to assess, agree and control the incidence of those works.

6.218 We considered that where a telecoms provider identifies the need for enabling works which fall within the scope of the PIA network access obligation, it should have the following options:

- i) Option 1: Undertake the enabling works itself at its own expense and risk (self-provision at own risk); or
- ii) Option 2: Undertake the enabling works itself but seek to recharge Openreach for the costs (self-provision and recharge); or
- iii) Option 3: Request Openreach to intervene and undertake the enabling works (Openreach enabling works).

6.219 In light of these options, we made the following proposals.

Requirement to publish engineering rules

6.220 In our April 2017 DPA Consultation, we considered that a telecoms provider that decides to undertake enabling works itself will need to ensure that it follows Openreach's engineering rules and meets Openreach's quality standards. Therefore, we proposed that the PIA Reference Offer should include:

- technical specifications for PIA, including:
 - technical specifications relevant to the repair of existing faulty Physical Infrastructure.

6.221 Our view was that Openreach is best placed to develop the detailed provisions with industry.

Process for Openreach to assess and authorise requests for enabling works

6.222 In our April 2017 DPA Consultation, we considered that where a telecoms provider identifies the need for enabling works and would like to complete that work itself and recharge Openreach for it, the process would need to allow Openreach to assess and approve the works (since the completion of the work will impact its cost base).

6.223 We considered that for telecoms providers using PIA, the authorisation process for enabling works should be equivalent to that followed by Openreach in similar circumstances when it is deploying its own network unless Openreach can justify the differences. We considered that this was consistent with the proposed non-discrimination

requirement. Our view was that, to the extent that BT cannot justify differences between its processes and those applied to other telecoms providers, Openreach must either:

- provide a set of rules and processes for enabling works which applies both to its own network deployment and to requests under PIA;
- or adjust its internal processes to match the approvals process for enabling work placed on other telecoms providers.

6.224 We also considered that telecoms providers should have certainty around the timescales for receiving authorisation from Openreach to proceed with enabling works. We considered that Openreach should establish SLAs and SLGs relating to the timescales for assessing and authorising requests by telecoms providers to complete enabling works as part of the PIA Reference Offer. Therefore, we proposed that the PIA Reference Offer includes:

- Service Level Commitments and Service Level Guarantees in relation to the timescales for BT to respond to a request by a Third Party to undertake works itself to relieve congested Physical Infrastructure.

6.225 Our view was that Openreach and telecoms providers are well placed to take forward the more detailed development of an appropriate SLA and SLG regime.

Certainty around timescales for Openreach to complete works

6.226 Where a telecoms provider requires Openreach to undertake enabling works, we considered that the telecoms provider needs to have a degree of certainty about how long the work will take to complete. Therefore, we considered that Openreach should establish SLAs and SLGs relating to the timescales for completing enabling works.

Stakeholder responses

Installation

6.227 CityFibre suggested that where work does not involve the construction of new ducts or new poles, any existing wayleave (i.e. a wayleave between BT and a third-party) should be deemed to cover the work conducted by a telecoms provider.⁶²⁴

Enabling works

6.228 Openreach was concerned about the risk of moral hazard given the commercial beneficiary of the enabling works (the telecoms provider) causes costs to be incurred but does not pay for them. Openreach did not see how allowing Openreach flexibility in its pricing of

⁶²⁴ CityFibre response to the April 2017 DPA Consultation, page 51.

different forms of enabling works would act to protect it from a moral hazard risk when the telecoms provider was not responsible for the costs.^{625 626}

- 6.229 CityFibre argued that if Openreach wishes to avoid complex or risky tasks defaulting to itself to resolve, the best solution would be to commit to creating clear guidance for how enabling works should be completed via a self-provision model.⁶²⁷

Requirement to publish engineering rules

- 6.230 Openreach supported the proposed requirement to publish engineering rules (noting that such rules are already published as part of the existing PIA product) but stressed the need for this to be balanced to differentiate build, and compete effectively, without constant recourse to Openreach's knowledge, expertise and Intellectual Property Rights (IPR).⁶²⁸
- 6.231 CityFibre highlighted the importance of Openreach being required to consult on best practice guidance (that would apply on a non-discriminatory basis) in relation to how requirements for enabling works are resolved.⁶²⁹

Process for Openreach to assess and authorise requests for enabling works

- 6.232 Openreach explained the need to exert strong financial and contractual controls, overall and on an individual job basis, to ensure the remedy is not misapplied; that only necessary and beneficial works are raised; and that such infrastructure is occupied and paid for on a long-term basis via long-term contracts. It considered that such issues and the details relating to the processes will need to be resolved in the legal instruments and as part of the PIA Reference Offer development.⁶³⁰
- 6.233 TalkTalk and Hyperoptic considered that there should be arrangements that allow telecoms providers to self-provide and recharge Openreach for completing enabling works without prior approval. TalkTalk suggested this could be where certain operational conditions are met (reflecting the approach Openreach uses with its own contractors).⁶³¹

Certainty around timescales for Openreach to complete works

- 6.234 Openreach expressed concerns about SLA/SLGs for the completion of enabling works it would be required to undertake and said that it could not support them without detailed consideration of what is reasonably necessary and within its control (backed off by the telecoms provider's forecast and committed demand). Openreach highlighted the challenges of setting up mechanisms to capture exceptions, complexities and

⁶²⁵ Openreach response to the April 2017 DPA Consultation, page 60.

⁶²⁶ We consider issues relating to the potential adverse effects of the PIA remedy in Section 2.

⁶²⁷ CityFibre response to the April 2017 DPA Consultation, page 48.

⁶²⁸ Openreach response to the April 2017 DPA Consultation, page 58.

⁶²⁹ CityFibre response to the April 2017 DPA Consultation, page 47.

⁶³⁰ Openreach response to the April 2017 DPA Consultation, page 59.

⁶³¹ TalkTalk response to the April 2017 DPA Consultation, page 10; Hyperoptic response to the April 2017 DPA Consultation, page 11.

categorisations of jobs and associated SLAs, clock stopping events, ‘section 58’ restrictions⁶³², matters beyond our reasonable control (MBORC) arrangements and procedures to authorise and validate requests.⁶³³

Our reasoning and decisions

Installation

- 6.235 A telecoms provider intending to install their network using PIA will need to comply with a set of rules including those relevant to safe working practices, engineering and operational practices, and technical specifications of equipment being installed using Openreach’s physical infrastructure. These rules will also need to capture requirements relating to the removal and recovery of equipment and cables relevant to operating a network. Our view is that such requirements need to be set out in the PIA Reference Offer.
- 6.236 We have decided to maintain the existing requirement for the PIA Reference Offer to include:
- conditions for the installation and recovery of cables and associated equipment.
- 6.237 BT’s wayleaves are bilateral agreements between BT and land owners giving it rights to deploy and maintain its network on private property. The extent of those rights is determined by individual wayleave agreements. Normally changes to wayleaves would require the express permission of the land owners concerned. Ofcom cannot therefore deem that wayleaves should cover work conducted by any other telecoms providers as part of a remedy relating to an SMP finding as CityFibre has suggested.

Enabling works

- 6.238 In Section 2, we explain that we have concluded that the scope of Openreach’s network access obligation should be more narrowly defined than we proposed in the April 2017 DPA Consultation. In particular, that the obligation should be limited to network adjustments that involve making permanent changes to the physical infrastructure. We explain that some enabling works are better described as ancillary activities that are reasonably expected as part of a telecoms provider’s installation activities, or that relate to maintaining an access network. As a result, these activities should not fall within the scope of Openreach’s network access requirement. Examples of these activities include desilting blocked ducts, pumping water from flooded chambers, removing obstructive tree branches.
- 6.239 Earlier in this section, we decided that the PIA Reference Offer condition should include:

⁶³² A Section 58 Notice can be issued by a local authority which prevents the digging up of a road for a period of between three to five years after the road has been resurfaced or reconstructed, unless the work is an emergency or needed to provide a new customer service.

⁶³³ Openreach response to the April 2017 DPA Consultation, page 60.

- conditions on which telecoms providers may elect to undertake repair or build works on behalf of BT.
- 6.240 This requirement extends to including conditions in the PIA Reference Offer which apply in cases where telecoms providers elect to undertake enabling works on behalf of BT.
- 6.241 We consider that where a telecoms provider identifies the need for enabling works which fall within the scope of the PIA network access obligation, it should have the following options:
- i) Option 1: Undertake the enabling works itself at its own expense and risk (self-provision at own risk); or
 - ii) Option 2: Undertake the enabling works itself but seek to recharge Openreach for the costs (self-provision and recharge); or
 - iii) Option 3: Request Openreach to intervene and undertake the enabling works (Openreach enabling works).

Requirement to publish engineering rules

- 6.242 We consider that a telecoms provider that decides to deploy a network using PIA (including undertaking enabling works) will need to ensure that it follows Openreach's engineering rules and meets Openreach's quality standards. We expect those engineering rules to be applied to telecoms providers and Openreach on a non-discriminatory basis.
- 6.243 We have decided that the PIA Reference Offer should include:
- technical specifications for PIA, including:
 - technical specifications relevant to the repair of existing faulty Physical Infrastructure.
- 6.244 Our view is that Openreach is best placed to develop the detailed provisions with industry.

Process for Openreach to assess and agree requests for enabling works

- 6.245 We consider that where a telecoms provider requests a network adjustment in the form of enabling works, a process will need to be established that allows for Openreach to assess and agree any works that it funds. In particular:
- cases where a telecoms provider would like to undertake the enabling work itself and recharge Openreach for the works; and
 - cases where a telecoms provider requests that Openreach undertake the works.
- 6.246 In view of BT's non-discrimination requirements, we consider that the process for such enabling works (that are within the scope of BT's network access requirement) should provide for equivalent outcomes and timescales as those for Openreach when it is deploying its own network (unless Openreach can justify differences).
- 6.247 In light of our decisions relating to the cost recovery of network adjustments and the financial limit, we recognise that Openreach will need to develop and introduce a set of

rules and processes. Our view is that the detailed set of rules and processes for assessing and agreeing works should be developed as part of industry discussions relevant to developing the new PIA Reference Offer (and indeed implementing our conclusions for the PIA remedy more broadly).

- 6.248 In relation to TalkTalk and Hyperoptic’s suggestion that arrangements should allow for telecoms providers to complete works (and recharge Openreach for these works) without prior approval, we note that evidence provided by Openreach indicates that where Openreach uses civil engineering contractors to deploy its own network, the contractor is required to seek authorisation from Openreach to complete any enabling works, where this would result in additional costs. Any unauthorised works are carried out at the contractor’s own risk and cost.⁶³⁴
- 6.249 We also consider that telecoms providers should have certainty around the timescales for receiving agreement from Openreach relating to a request for a network adjustment in the form of enabling works. This is particularly important since a telecoms provider is likely to have engineers in the field deploying a network when enabling works are identified and need to be undertaken. Therefore, we have decided that Openreach should establish SLAs and SLGs relating to the timescales for assessing and authorising requests by telecoms providers to complete enabling works as part of the PIA Reference Offer.
- 6.250 Accordingly, we have decided that the PIA Reference Offer includes:
- Service Level Commitments and Service Level Guarantees in relation to the timescales for BT to respond to a request by a telecoms provider to undertake works itself to relieve congested Physical Infrastructure.
- 6.251 We consider that Openreach and telecoms providers are well placed to take forward the more detailed development of an appropriate SLA and SLG regime as part of establishing the new PIA Reference Offer.

Certainty around timescales for Openreach to complete works

- 6.252 We consider that a telecoms provider intending to use PIA on a large scale is likely to have a strong incentive to undertake its own enabling works. This is because it is likely to have its own workforce in-field (during its network instalment) that is capable of completing enabling works without Openreach’s involvement.
- 6.253 However, where a telecoms provider does require Openreach to undertake enabling works, we continue to consider that the telecoms provider needs to have a degree of certainty about how long the work will take to complete. Therefore, we consider that Openreach should establish SLAs and SLGs relating to the timescales for completing enabling works.
- 6.254 While we acknowledge the points made by Openreach relating to the challenges involved in developing SLAs and SLGs, and are mindful that in certain circumstances there will be

factors that are outside the control of Openreach, we also consider that SLAs and SLGs can be established that accommodate these challenges.

- 6.255 We consider that Openreach and telecoms providers are well placed to take forwards the more detailed development of an appropriate SLA and SLG regime. Consistent with the non-discrimination obligation, unless differences can be justified, we expect the timescales for completing such work to be equivalent to comparable work in relation to Openreach's own fibre deployment.
- 6.256 Earlier in this section, we decided that the PIA Reference Offer should include Service Level Commitments and Service Level Guarantees in relation to the timescales for completion by BT of any works necessary to relieve congested Physical Infrastructure (including the repair of existing faulty infrastructure and the construction of new physical infrastructure) other than a congested Pole.

Connecting the customer

- 6.257 The final connection between a customer's premises and the access network deployed by the telecoms provider is known as the 'lead-in'.
- 6.258 Around 50% of UK premises have overhead lead-ins in the form of dropwires attached to the premises from poles, while the other 50% have underground lead-ins, either through ducts or as directly buried cable. A geographic area is likely to have a mix of both underground lead-ins and overhead lead-ins. Therefore, for a telecoms provider aiming to deploy a broadband access network at scale using PIA, it is important that the remedy is effective for both overhead and underground lead-ins.
- 6.259 This part of the network has unique characteristics as infrastructure is, in general, associated solely with single premises. Moreover, the existing lead-in infrastructure is often designed and configured for the provision of minimal cable installations, which presents potential capacity constraints for a telecoms provider intending to deploy its network using that infrastructure.
- 6.260 Under the current PIA process:
- Underground lead-ins (to the extent that lead-in duct exists) can be reserved by a telecoms provider prior to it deploying its network or in response to an end customer order.
 - For overhead lead-ins, telecoms providers can request access to locate their own equipment at the top of an Openreach pole and also to use their own dropwire to make connections to customer premises (in compliance with specified engineering rules and health and safety standards).

Our proposals

Overhead lead-ins

- 6.261 In the April 2017 DPA Consultation, we considered that where the proposed access obligation places a requirement on BT to address a distribution pole capacity constraint, Openreach should have the flexibility to choose how to provide the additional capacity, subject to it having the appropriate incentives to delivery it efficiently.
- 6.262 We noted that Openreach would require survey information to determine how best to provide additional capacity and considered how it could be gathered. We considered that it would be impractical and inefficient for Openreach to undertake surveys for each customer connection and therefore suggested that surveys could be undertaken by telecoms providers' accredited surveyors. We also suggested that survey information could be recorded in a database operated by Openreach and updated as further customers are connected to minimise the need for future site surveys.
- 6.263 We considered that once a telecoms provider has gained a customer, it is imperative that it is able to provide the final connection promptly, and to a known timescale, if the telecoms provider is to avoid significant risk of losing an acquired customer. Therefore, we proposed that the PIA Reference Offer includes:
- Service Level Commitments and Service Level Guarantees in relation to the timescales for BT to respond to a request by a Third Party to relieve a congested Pole where such a response confirms that the order has been accepted and how BT proposes to relieve that congestion; and
 - Service Level Commitments and Service Level Guarantees in relation to the timescales for completion by BT of any works necessary to relieve a congested Pole.
- 6.264 We expected that Openreach would engage with industry before putting in place SLAs and SLGs which meet this obligation. However, our expectation was that the SLAs and SLGs put in place would reflect retail customer expectations that new services will be provided promptly.

Underground lead-ins

April 2017 DPA Consultation

- 6.265 In our April 2017 DPA Consultation, we noted that a telecoms provider intending to connect a customer via an underground lead-in using Openreach's ducts could face one of the following scenarios:
- duct available with sufficient capacity to deploy an additional cable to connect a customer and no blockages; or
 - duct available but with insufficient capacity or damage that prevents the telecoms provider from deploying an additional cable to connect the customer; or
 - no duct available with the existing lead-in directly buried.

- 6.266 Our view was that where duct has sufficient capacity (and there are no blockages) a telecoms provider should be able to order space in that duct from Openreach and deploy its cable, as is currently the case under PIA (without requiring adjustments to Openreach's infrastructure).
- 6.267 Our view was that in all other circumstances, the telecoms provider will not be able to connect a customer using a BT duct lead-in without adjustments to the infrastructure. Furthermore, in our proposals relating to the scope of BT's network access requirements, we indicated that network adjustments to lead-ins were likely to fall outside the scope of Openreach's network access obligation.
- 6.268 Notwithstanding the above, we considered that where a spine duct is accessible, but the lead-in is not, there could be circumstances where BT is required (as part of its network access requirement) to install a footway box outside the property to allow the telecoms provider to connect into BT's physical infrastructure (i.e. the spine duct).
- 6.269 To assist Openreach and telecoms providers to identify those circumstances where a footway box installation would be appropriate, we considered that a telecoms provider should provide indicative information relating to the type, nature and condition of lead-ins associated with premises to which it is proposing to connect to its network. This information could be gathered by surveying the distribution chamber that supplies a set of premises, and then be used to determine any adjustment that the telecoms provider is requesting Openreach to make. Openreach would then be able to consider the request.
- 6.270 We considered that where the provision of a footway box falls within BT's network access requirement, it is imperative for a telecoms provider to have certainty regarding the timescales that apply in connecting customers it has already won, using that footway box. Therefore, we proposed that the PIA Reference Offer includes:
- SLAs and SLGs relating to the timescales for the completion by BT of any works necessary to relieve congested Physical Infrastructure where this comprises the installation of a Footway Box.
- 6.271 We expected that Openreach would engage with industry before putting in place SLAs and SLGs which meet this obligation. However, our expectation was that the SLAs and SLGs put in place will reflect retail customer expectations that when they have contracted with a new telecoms provider, their new service will be provided promptly.

August 2017 DPA Consultation

- 6.272 In our August 2017 DPA Consultation, as part of examining the scope of Openreach's network access requirement (and setting out our proposals for a financial limit), we considered situations that may require the installation of footway boxes in more detail. Our updated view was that the requirement to install footway boxes was most likely to be necessary where there are ducted lead-ins connected to congested spine duct running down the street with a 'swept-tee' joint.
- 6.273 Our view was that to use the lead-in ducts, telecoms providers must be able to access the spine duct to which lead-in ducts are connected, and as swept-tee joints are directional,

the existing copper cable architecture must be followed. Our view was that this architecture potentially resulted in a ‘pinch point’ close to the distribution point where the existing copper lead-in cables converge. Depending on the number of premises served and the number and size of any other cables in the spine duct, there may be insufficient capacity to accommodate a second set of lead-in cables for a fibre network. We proposed that the congestion could be relieved by adding footway boxes along the spine duct so that the congested sections of duct can be bypassed and the swept-tee connections to the lead-ins accessed.

Stakeholder responses

Overhead lead-ins

- 6.274 Openreach said that given that Ofcom’s overall guidance was that the purpose of the PIA remedy is to ‘free up’ existing capacity, rather than to construct new infrastructure, it was willing to work the Passive Industry Working Group to consider pragmatic and efficient options for overhead lead-ins. Openreach also supported the idea that it should have the flexibility to decide on the best way to provide overhead lead-in capacity if viable.
- 6.275 Openreach suggested that Ofcom should consider the practicality of applying its proposals in a customer order driven environment. Given end customer expectations that a new broadband connection should be provided in a matter of days, a process where a telecoms provider comes across a congested pole and requires capacity to be provided would not provide a suitable end customer experience (particularly if the only solution is significant build works). Openreach also noted that a requirement to survey each request, would impact timescales.⁶³⁵
- 6.276 Openreach did not support Ofcom’s suggestion that a database could be developed to hold survey information about how capacity to individual premises would need to be provided. It suggested that it would be a time consuming exercise and questioned its value for future capacity relief requests, as the likely occurrence is low once a pole’s capacity has been uplifted.⁶³⁶ CityFibre suggested that a database could facilitate the process for connecting the customer and could be created (and updated by telecoms providers and Openreach) if there was an agreed set of survey database fields and assessment criteria.⁶³⁷
- 6.277 CityFibre considered that the proposals relating to overhead lead-ins would result in a process that was not workable for the following reasons:
- Only Openreach can implement network adjustments on poles.
 - The process requires several appointments with the end customer and cannot fulfil the requirement for a short and predictable installation period.

⁶³⁵ Openreach response to the April 2017 DPA Consultation, page 62.

⁶³⁶ Openreach response to the April 2017 DPA Consultation, page 63.

⁶³⁷ CityFibre response to the April 2017 DPA Consultation, page 50.

- It is necessary to place an order with Openreach to get an installation date for an individual customer. If the customer is unhappy with the time to provide the service that order needs to be cancelled.⁶³⁸
- The indicative timescales proposed by Ofcom for Openreach are too lengthy.⁶³⁹

6.278 CityFibre argued that:

- Telecoms providers should be able to undertake minor enabling works themselves (such as making a pole climbable). More extensive works such as pole replacement should be undertaken by Openreach given that the impact of the works is felt by all customers connected to that pole.
- Telecoms providers should be able to undertake all stages of network deployment up to the top of the pole (operating to agreed technical and operational standards), and that telecoms providers should bear the cost of any remedial work that might subsequently be required and be responsible to notify customers affected by their work.⁶⁴⁰
- Telecoms providers should be able to install or replace a single lead-in (to agreed technical standards) given the benefits associated with the telecoms provider being able to do this 'on demand' from the end customer.⁶⁴¹

6.279 CityFibre proposed a process that would allow telecoms providers to determine the type of network adjustment required (based on a ruleset), and to install and test a hybrid copper/fibre cable. This would remove Openreach from the process and allow for a single end customer appointment except in circumstances where a pole upgrade was needed (or a dropwire needed to be recovered).⁶⁴²

6.280 Virgin Media also suggested that an option that allowed telecoms providers to remove the existing dropwire and replace it with a hybrid dropwire should be considered further.⁶⁴³ Openreach made a similar point saying that that industry discussions should consider whether there may be better options by which additional capacity could be made available and controlled by the telecoms provider (e.g. by the telecoms provider removing the copper dropwire and installing a fibre, hybrid cable or tube in its place).⁶⁴⁴

6.281 Hyperoptic and Flomatik raised concerns about the complexity of Ofcom's proposals and preferred a remedy where Openreach was required to replace the copper dropwire with a hybrid dropwire in all cases where there was not capacity on a pole.^{645 646}

⁶³⁸ CityFibre supplementary response to the April 2017 DPA Consultation, page 6.

⁶³⁹ CityFibre response to the April 2017 DPA Consultation, page 49.

⁶⁴⁰ CityFibre response to the April 2017 DPA Consultation, page 51.

⁶⁴¹ CityFibre response to the April 2017 DPA Consultation, page 51.

⁶⁴² CityFibre supplementary response to the April 2017 DPA Consultation, page 8.

⁶⁴³ Virgin Media response to the April 2017 DPA Consultation, page 2.

⁶⁴⁴ Openreach response to the April 2017 DPA Consultation, page 63.

⁶⁴⁵ Hyperoptic response to the April 2017 DPA Consultation, page 11.

⁶⁴⁶ Flomatik response to the April 2017 DPA Consultation, page 7.

Underground lead-ins

- 6.282 Openreach agreed with the proposed approach that duct lead-ins should be constructed and funded by telecoms providers rather than Openreach.
- 6.283 Openreach did not support the proposal that it should fund and install new footway boxes outside customers' premises. It considered this extremely costly and noted that telecoms providers can choose other less costly network design options such as connecting their lead-ins to the nearest Openreach joint box.⁶⁴⁷ Hyperoptic, on the other hand, supported the proposal for Openreach to provide footway chambers since this would increase the efficiency of connecting premises to spine duct.⁶⁴⁸
- 6.284 CityFibre suggested that telecoms providers should have greater flexibility to 'dig down' into the Openreach network and deploy their own chambers and break-out points (to relieve congestion in underground lead-ins).⁶⁴⁹

Our reasoning and decisions

Overhead lead-ins

- 6.285 By way of background, by this stage in the PIA process, we envisage that telecoms providers will have deployed their access networks and have installed their equipment on BT's poles. Therefore, they will be ready to install dropwire connections to customers premises in response to customer orders, subject to the availability of spare capacity.
- 6.286 Our aim is that telecoms providers can connect customers effectively and efficiently using overhead lead-ins from poles. In support of this aim, it is imperative that the PIA processes supporting customer connection activities reflect retail customer expectations for new service connections. This is because excessive delays or uncertainty in connecting customers could result in telecoms providers losing acquired customers.
- 6.287 We consider that the following activities will impact the timescales for a telecoms provider to connect a customer via an overhead lead-in:
- Surveying activities relevant to poles.
 - Openreach responding to a PIA order from a telecoms provider (where the pole is not congested).
 - Adjustments to poles to relieve congestion (i.e. providing capacity).
- 6.288 Our view is that an effective PIA remedy is best furthered through:
- Openreach facing the appropriate incentives to undertake activities relevant to its network access obligation in a timely manner; and
 - Where appropriate, allowing telecoms providers the opportunity to undertake activities with less intervention from Openreach.

⁶⁴⁷ Openreach response to the April 2017 DPA Consultation, page 63.

⁶⁴⁸ Hyperoptic response to the April 2017 DPA Consultation, page 12.

⁶⁴⁹ CityFibre response to the April 2017 DPA Consultation, page 49.

Improving the pole survey process

- 6.289 We acknowledge Openreach's concerns about our suggestion that a pole capacity database could be developed, and other respondents desire for solutions that would minimise the need for Openreach's intervention.
- 6.290 Under current arrangements, telecoms providers can undertake pole surveys for dropwire attachments and install dropwires without assistance from Openreach. Our understanding is that most BT poles are not currently capacity constrained, so telecoms providers should be able to make most customer connections without assistance from Openreach.⁶⁵⁰
- 6.291 A proportion of BT's poles have limited spare capacity (or may reach this point in future). Absent a central capacity record, there must inevitably be uncertainty about whether there will be spare capacity to fulfil individual customer orders.⁶⁵¹ Consequently, it will be necessary to undertake a survey to determine the availability of spare capacity. There will also be uncertainty about the provisioning lead-time at the point of sale, given the risk that a network adjustment may be required.
- 6.292 While we acknowledge that a pole capacity database may not be the best approach, we think it would be useful for Openreach and industry to explore ways in which uncertainty about the provisioning lead-time at the point of sale could be minimised. These might include for example:
- allowing telecoms providers to make some types of adjustments as suggested by CityFibre;
 - hybrid dropwire solutions as supported by several respondents (discussed further below); or
 - setting capacity thresholds that would trigger adjustments in anticipation of forecast demand.⁶⁵²

Incentivising Openreach to complete network adjustments to poles in a timely manner

- 6.293 In circumstances where a pole is capacity constrained, a telecoms provider will need to request a network adjustment to the pole. Given our decision that since an accredited telecoms provider should be able to undertake all aspects of pole survey, it will be able to provide Openreach with the relevant information on the nature of the capacity constraint. We consider that this information should allow Openreach to decide on how congestion

⁶⁵⁰ Openreach has provided information relating to a study of pole loading capacity it had undertaken in 2016. This study was undertaken to inform its full-fibre trials. The results from this study indicated that around 7% of poles may not have capacity to attach an additional dropwire within current rules. Openreach estimated that if full-fibre take-up were to increase, then for every 5% of additional take-up, an additional 1.5% of the pole estate would be likely to reach its maximum capacity according to current rules. Openreach response to question 10 of the WLA s.135 notice issued on 6 March 2017.

⁶⁵¹ Even if telecoms providers maintain their own survey records, they could be sure that spare capacity observed during a previous survey (e.g. during network deployment or a previous customer installation) would still be available.

⁶⁵² For example, where 75% of available capacity is exhausted prior to an access seeker looking to add additional dropwires, this could be the agreed trigger for the telecoms provider to request a network adjustment from Openreach (e.g. in the form of a larger pole).

relating to a pole should be relieved (although we acknowledge that Openreach may choose to undertake its own survey in certain circumstances, prior to deciding).

- 6.294 We consider that Openreach could comply with its network access requirement to provide additional capacity from a pole in several ways. For example, it could:
- Remove an existing unused copper dropwire to free-up space;
 - Replace an existing copper dropwire with a hybrid copper/microtube drop cable which the telecoms provider could use for its own fibre; or
 - Replace the existing pole with a larger/stronger pole to allow for more capacity or possibly strengthen the pole.
- 6.295 The most appropriate approach to providing additional capacity is likely to depend on individual circumstances, such as the pole size, pole location and the number and radial distribution of dropwires.
- 6.296 As we have discussed in Section 2 we consider that where an adjustment falls within the scope of the PIA network access obligation, Openreach should be able to choose the form of adjustment it makes to meet its obligation. This provides Openreach with the flexibility to choose the most efficient solution possible, and allows it to take account of its own future requirements.
- 6.297 Therefore, subject to Openreach having the appropriate incentives to deliver capacity for other telecoms providers' overhead lead-ins efficiently, our view is that Openreach should have the flexibility to choose the solution. As noted above, we also consider it is imperative that the PIA processes supporting customer connection activities reflect retail customer expectations for new service connections. In support of these aims, we consider that Openreach should be required to offer SLAs and SLGs that will incentivise it to inform telecoms providers about how and when it will address capacity constraints; and to complete the works to provide additional capacity in a timely manner. Therefore, we have decided that the PIA Reference Offer should include:
- Service Level Commitments and Service Level Guarantees in relation to the timescales for BT to respond to a request by a telecoms provider to relieve a congested Pole where such a response confirms that the order has been accepted and how BT proposes to relieve that congestion; and
 - Service Level Commitments and Service Level Guarantees in relation to the timescales for completion by BT of any works necessary to relieve a congested Pole.
- 6.298 We have decided that Openreach should engage with industry before putting in place SLAs and SLGs that meet its obligation to relieve congestion on a pole.
- 6.299 In our April 2017 DPA Consultation, we suggested that the timescales relevant to the SLAs and SLGs should align with those expected by end customers connecting to a new telecoms provider as part of purchasing retail broadband. In response, Openreach suggested the lead times for delivering this capacity could conflict with timescales expected in the context of connecting an end customer (particularly if the only solution is significant build works).

- 6.300 We acknowledge that significant build works, e.g. in the form of replacing a pole with a larger, stronger pole, may not be possible within the timescales expected by retail customers in relation to connecting a new service. However, as referred to earlier, we consider that industry is able to explore practical arrangements so that incidences of such network adjustments being required at the stage of connecting the customer are minimised. These include exploring capacity thresholds that would allow for pole replacement works to be identified and completed prior to capacity on the pole being exhausted.
- 6.301 Notwithstanding this, we reiterate our view that the PIA processes supporting customer connection activities should reflect timescales relevant to retail customer expectations for new service connections.
- 6.302 Therefore, while we have decided that Openreach should engage with industry before putting in place SLAs and SLGs that meet its obligation to relieve congestion on a pole, we maintain our view that SLAs and SLGs can be developed that reflect retail customer expectations that their new service will be provided promptly.

Hybrid dropwire solutions to pole congestion

- 6.303 As noted above, there was support amongst consultation respondents for hybrid dropwire solutions to pole capacity constraints.⁶⁵³ Either a full-service solution under which Openreach would install hybrid dropwires (along the lines of our 2016 PIA Consultation proposal), or alternatively a self-service solution under which telecoms providers would replace Openreach dropwires with hybrid dropwires.
- 6.304 We do not accept that the PIA remedy would be unworkable in the absence of such arrangements as CityFibre has suggested. Our view is that the requirements we have set out in this Statement provide for an effective and proportionate remedy, allowing telecoms providers to deploy networks using Openreach's physical infrastructure.
- 6.305 We recognise that hybrid dropwire solutions have potential attractions including: fewer pole upgrades, simpler customer switching and greater equivalence between BT and other telecoms providers in the use of Openreach's poles. There would, however, be a range of technical, commercial and process issues to address, such as:
- technical specifications for hybrid dropwires;
 - ownership and responsibility for maintenance of hybrid dropwires;
 - arrangements for notification and coordination of work on other telecoms providers networks;
 - liability for damages and service interruptions on other telecoms providers networks
 - arrangements for customer switching, including:

⁶⁵³ A hybrid dropwire is a dropwire containing both a copper and a fibre cable (or alternatively a microtube for fibre cable). It could therefore provide telecoms providers with a fibre connection while also maintaining Openreach's copper network connection.

- whether (and how) hybrid dropwires could be transferred between telecoms providers; and
- the recovery of costs relating to the transfer of the dropwire, and / or the costs from its original provision.

6.306 In view of the potential benefits and the support amongst consultation respondents we consider that hybrid dropwire solutions merit further investigation. In this context we welcome Openreach's suggestion that hybrid dropwire solutions could be explored via industry discussions. Therefore, while we are not imposing a hybrid dropwire solution, we are supportive of industry discussions to assess the feasibility of this approach.

Underground lead-ins

- 6.307 Our aim is that telecoms providers can connect customers effectively and efficiently using underground lead-ins.
- 6.308 We consider that for PIA to be effective for large scale network deployments, the timescales relevant to connecting a customer (following receipt of a customer order) should aim to reflect those expected by end customers when purchasing a retail broadband service. This is because excessive delays or uncertainty in connecting a customer (following winning a prospective order) could result in telecoms providers losing sales.
- 6.309 In Section 2, we set out our conclusions relating to the scope of Openreach's network access requirement. This includes our conclusions in relation to the scope of the network access requirement for underground lead-ins.
- 6.310 Based on those conclusions, where lead-in duct is available with sufficient capacity to deploy an additional cable to the customer (without network adjustments being required), a telecoms provider would be able to order space in that duct and thereafter connect a customer.
- 6.311 In Section 2, we provide our guidance on the scope of Openreach's network access requirement to make network adjustments in relation to underground lead-ins, in circumstances where there is no duct available (i.e. where Openreach employs directly buried lead-ins); and the lead-in duct is congested (either through a lack of available capacity or because it is damaged).
- 6.312 Our decisions set out earlier in this section regarding PIA Reference Offer requirements relating to service establishment and accreditation, planning and surveying; forecasting; operational processes for ordering PIA; and network deployment (build, installation and enabling) are relevant to underground lead-ins. Notwithstanding this, our expectation is that the specific SLAs and SLGs put in place relating to accessing physical infrastructure relevant to underground lead-ins should reflect industry expectations of reasonable timescales when connecting a new retail customer.

Accessing spine duct from a customer premises

- 6.313 We consider that it is important that telecoms providers are able to access Openreach's spine duct and the remaining parts of Openreach's physical infrastructure where a ducted lead-in exists, regardless of its state of repair or available capacity.⁶⁵⁴
- 6.314 In our April 2017 DPA Consultation, we proposed that in cases where the spine duct is accessible, but the lead-in is not, as part of its network access requirement, Openreach could be required to install a footway box outside the property to allow the telecoms provider to connect to BT's physical infrastructure (i.e. spine duct). We also proposed that the PIA Reference Offer include SLAs and SLGs relating to the timescales for Openreach to install the footway box.
- 6.315 Following further consideration of our proposal, our view is that the most efficient solution that would allow telecoms providers to access spine duct is likely to vary according to the circumstances. Therefore, we have decided not to impose a specific PIA Reference Offer requirement relating to the provision of footway boxes.
- 6.316 Nevertheless, given the importance to telecoms providers of accessing Openreach's spine duct, we consider that a method or set of methods will need to be developed that allow telecoms providers to connect to Openreach's duct network as close as possible to their lead-in. Our view is that industry is best placed to develop a solution through discussions at the PIWG, chaired by the OTA2.

Footway boxes to relieve congestion in spine duct

- 6.317 As discussed in Section 2, as a result of Openreach's network architecture, a 'pinch point' can exist in spine duct close to the distribution point where existing copper lead-in cables converge. Accordingly, depending on the number of premises served and the number and size of any other cables in the spine duct, there may be insufficient capacity to accommodate a second set of lead-in cables for a telecoms provider's fibre network.
- 6.318 Our view is that congestion, in the form of pinch points in the spine duct close to the distribution point, could be relieved by adding footway boxes along the spine duct so that the congested sections of duct can be bypassed and the lead-ins accessed.
- 6.319 In Section 2, we conclude that network adjustments for an additional footway box or boxes to address this congestion, is likely to fall within the scope of Openreach's network access obligation.
- 6.320 Our decisions set out earlier in this section regarding PIA Reference Offer requirements relating to service establishment and accreditation, planning and surveying; forecasting; operational processes for ordering PIA; and network deployment (build, installation and

⁶⁵⁴ Our understanding is that directly buried lead-ins span the total distance between the final distribution point and the customer premises. That is, Openreach's network architecture does not employ a combination of spine duct or rider duct and a directly buried lead-in from that duct to a specific customer premises. Openreach response to question 3 of the 2nd WLA s.135 notice issued on 30 November 2017.

enabling) will be relevant to accessing footway boxes (and requesting network adjustments relating to footway boxes).

- 6.321 We acknowledge that there will be instances where network adjustments relevant to installing additional footway boxes are identified when a telecoms provider is seeking to connect a customer.
- 6.322 However, our view is that industry and Openreach should agree practical arrangements that minimise such incidences and thereby allow telecoms providers to connect customers (via underground lead-ins) in an efficient and effective manner with as few visits to the customer premises as possible.
- 6.323 We consider that at the point of undertaking an initial survey, and subsequently deploying its network past the customer premises, the telecoms provider should be able to assess whether pinch points exist in spine duct that would impede it connecting customers at a later stage.
- 6.324 Our view is that arrangements could be developed so that, where available capacity is identified to be below an agreed threshold, this could be the trigger for the telecoms provider to request a network adjustment from Openreach (e.g. in the form of a footway box or boxes). That is, the network adjustments relevant to providing additional capacity could be identified and completed at an earlier stage of the process.

Maintenance

Our proposals

- 6.325 In our April 2017 DPA Consultation, we proposed to maintain the existing requirement that the PIA Reference Offer include:
- the arrangements for maintenance of cables and associated equipment installed by Third Parties and of the Physical Infrastructure, including the provision for the temporary occupation of additional infrastructure capacity for the installation of replacement cables.

Stakeholder responses

- 6.326 Openreach supported the proposed requirements for the PIA Reference Offer to include maintenance arrangements. It considered that telecoms providers should be responsible for moving their own cables and equipment in response to external client requests.⁶⁵⁵
- 6.327 CityFibre considered that some rules will be necessary to determine rights and responsibilities in respect of ongoing maintenance.⁶⁵⁶

⁶⁵⁵ Openreach response to the April 2017 DPA Consultation, page 63.

⁶⁵⁶ CityFibre response to the April 2017 DPA Consultation, page 51.

- 6.328 The PAG proposed that SLAs and SLGs will be essential for ongoing maintenance, and that these should be based on similar reporting requirements for Ethernet services.⁶⁵⁷

Our reasoning and decisions

- 6.329 Telecoms providers must be able to maintain their networks, so arrangements for access to BT's infrastructure for maintenance purposes are an essential feature of the PIA service. These processes will be likely to include:
- arrangements for timely access to BT physical infrastructure for maintenance purposes; and
 - temporary occupation of additional duct capacity to facilitate the installation of replacements for faulty cables and cable rearrangements.
- 6.330 The maintenance arrangements will also need to include processes for the maintenance, repair and replacement of the BT duct and pole infrastructure used by telecoms providers. The processes will be likely to include:
- arrangements for telecoms providers to notify Openreach about faulty BT infrastructure and for Openreach to carry out repairs;
 - arrangements for Openreach to notify telecoms providers of faults and associated repair activity affecting telecoms providers' cables and equipment; and
 - arrangements for Openreach and telecoms providers to coordinate works, e.g. temporary rearrangement of cables and equipment to facilitate infrastructure repairs.
- 6.331 BT's duct and pole infrastructure will be an integral part of the services provided by telecoms providers using PIA. Inevitably, some infrastructure faults, maintenance and repair activities will affect telecoms providers services.
- 6.332 We consider that a process needs to be established and promulgated by Openreach that allows the maintenance, repair and replacement of duct and pole infrastructure in coordination with all users of that infrastructure and in compliance with BT's SMP non-discrimination obligations.
- 6.333 We have decided to maintain the existing requirement that the PIA Reference Offer include:
- the arrangements for maintenance of cables and associated equipment installed by telecoms providers and of the Physical Infrastructure, including the provision for the temporary occupation of additional infrastructure capacity for the installation of replacement cables.
- 6.334 While we are not imposing SLAs and SLGs for maintenance, we consider that Openreach and industry should consider the extent to which these are reasonably required for the time critical infrastructure repair and maintenance activities undertaken by Openreach. We

⁶⁵⁷ The PAG response to the April 2017 DPA Consultation, page 27.

also consider that service levels offered will need to be consistent with BT's non-discrimination obligations.

- 6.335 While duct and pole sharing regimes in other countries may provide useful context, the SLAs and SLGs may not be directly transferable to the UK, for example because of differences in street works notification arrangements. We have therefore decided not to provide guidance based on international examples as the PAG suggested.
- 6.336 Our view is that further work will be required to develop SLAs and SLGs which are practicable, and which meet telecoms providers' needs. We consider that this work is best progressed by Openreach and industry at the Passives Industry Working Group.

Proposals for SLA and SLG negotiations

- 6.337 In the 2017 Quality of Service Consultation, we proposed a set of principles regarding the conduct of the SLA/SLG contract negotiation process in relation to the supply of Wholesale Line Rental (WLR), Local Loop Unbundling (LLU) and Virtual Unbundled Local Access (VULA) services. This approach follows that previously adopted in the 2014 FAMR Statement and subsequently amended in the 2016 BCMR Statement.^{658 659}
- 6.338 In summary, this approach sets out a defined, structured and open process for the negotiation of SLA/SLG terms and conditions. It reserves a central role for the OTA2 and sets a time limit for negotiations. A set of four principles are specified for the conduct of the contract negotiations and a set of four criteria are specified for the OTA2 to assess whether requests for SLA/SLG negotiations should be facilitated through the process. A more detailed description is provided at paragraphs 8.93 to 8.105 of the March 2017 Quality of Service (QoS) Consultation.⁶⁶⁰
- 6.339 We consider that the rationale for applying the principles and the criteria to WLR, LLU and VULA services, as set out in paragraph 8.106 of the March 2017 QoS Consultation, is also applicable to PIA services. Moreover, we consider that the application of these principles has worked well in contract negotiations thus far. We therefore consider that the principles and the criteria should also apply to SLA/SLG contract negotiations in respect of PIA services.

Plans for new physical infrastructure

Our proposals

- 6.340 In our April 2017 DPA Consultation, we noted that there is an existing requirement that the PIA Reference Offer includes:

⁶⁵⁸ 2014 FAMR Statement, Volume 1. https://www.ofcom.org.uk/data/assets/pdf_file/0032/78863/volume1.pdf.

⁶⁵⁹ 2016 BCMR Statement, Volume 1. https://www.ofcom.org.uk/data/assets/pdf_file/0015/72303/bcmr-final-statement-volume-one.pdf.

⁶⁶⁰ March 2017 QoS Consultation. https://www.ofcom.org.uk/data/assets/pdf_file/0033/99645/QoS-WLR-MPF-GEA.pdf.

- a procedure for BT to announce plans reasonably in advance for new construction of Physical Infrastructure such that Third Parties may request BT to install additional capacity for those Third Parties.
- 6.341 We explained that the requirement was imposed as an alternative to requiring BT to install additional capacity to accommodate potential future demand from telecoms providers. As such, BT is required to announce its infrastructure construction projects to give telecoms providers an opportunity to request additional capacity for their needs. We considered that it was appropriate to maintain the requirement because:
- It was likely to be more efficient for either BT or telecoms providers to install additional duct capacity in response to firm requirements.
 - There is likely to be scope for co-investment opportunities between Openreach and other telecoms providers relating to the construction of new physical infrastructure.
- 6.342 Therefore, we proposed to maintain this PIA Reference Offer requirement.
- 6.343 We also proposed that Openreach's network records should include information relating to significant new infrastructure construction, as soon as it is available to Openreach itself for planning its own network deployment. Our view was that this would enable telecoms providers to request capacity and for Openreach to amend its plans at this pre-build stage.

Stakeholder responses

- 6.344 Openreach objected to our proposals, arguing that they were unjustified and disproportionate. It said that the proposals go significantly further than section 8 of the ATI Regulations, requiring BT to announce construction plans in advance rather than in response to requests, and would present a material competition law risk. Openreach said we had not explained why the proposed obligation was required in addition to the ATI Regulations.⁶⁶¹
- 6.345 Openreach raised concerns about the impact of the proposals on infrastructure construction to serve new housing developments given that site developers may require confidentiality or exclusivity agreements.
- 6.346 Openreach also noted that the existing requirement was put in place to mitigate the need for Openreach to provide additional capacity for the future capacity needs of other telecoms providers. However, given the proposed new requirement for Openreach to make network adjustments at points of congestion, the existing requirement was no longer valid.⁶⁶²
- 6.347 [S<] welcomed our proposals. However, it questioned how a joint investment initiative between Openreach and a telecoms provider that requires build work could be notified without jeopardising the confidential investment and deployment plans.⁶⁶³

⁶⁶¹ Openreach response to the April 2017 DPA Consultation, pages 50 and 61.

⁶⁶² Openreach response to the April 2017 DPA Consultation, page 61.

⁶⁶³ [S<]

- 6.348 CityFibre indicated that our proposals seemed sensible. It also noted that there may be a public policy argument for network deployments to be carefully coordinated, to ensure that full-fibre networks are built rapidly across as much of the UK as possible. It further stated that such coordination might need to be under the aegis of the regulator to avoid accusations of anti-competitive behaviour.⁶⁶⁴

Our reasoning and decisions

- 6.349 Our view is that where a telecoms provider's infrastructure demands can be coordinated and completed as part of BT's own network adjustments, this may potentially lead to efficiency benefits. For example, coordinating and constructing physical infrastructure to accommodate capacity for several telecoms providers in a single activity would avoid the additional costs of digging-up roads in the event that each telecoms provider built its own physical infrastructure. As such, a requirement for BT to announce plans for the construction of new Physical Infrastructure in advance could have some benefits.
- 6.350 However, on further consideration, our view is that the scope for such coordination, and therefore the resulting efficiency benefits, may be limited. This is because telecoms providers will plan the deployment of their networks independently of Openreach. Accordingly, the benefits would only be realisable where telecoms providers' planning processes coincide with Openreach's, such that they are in a position to request additional capacity during the narrow window between Openreach announcing its plans and commencing its construction.
- 6.351 Furthermore, we are concerned that placing a requirement for BT to notify planned infrastructure could impede BT's incentives to build infrastructure, both as part of its own investment plans and those where it is looking to finance build through co-investment arrangements with other telecoms providers. As such, this could have a detrimental impact on both investment and competition.
- 6.352 In light of our concerns, we are not requiring that the PIA Reference Offer includes a condition for BT to announce plans in advance relating to the construction of new Physical Infrastructure.
- 6.353 In accordance with this decision, we are not requiring that BT's network records include information relating to BT's planned infrastructure build. Our view is that telecoms providers should have access to network records relating to BT's physical infrastructure at the point that the infrastructure is in situ or BT takes ownership of it (e.g. where a property developer has built the physical infrastructure and has handed it over to BT).

Summary of decisions

- 6.354 We set out above a number of decisions to impose regulatory requirements pursuant to SMP conditions. For clarity, we summarise our decisions below.

⁶⁶⁴ CityFibre response to the April 2017 DPA Consultation, page 48.

6.355 We have decided that the PIA Reference Offer must set out (as a minimum):

- conditions for telecoms providers to gain access to Physical Infrastructure including if appropriate training, certification and authorisation requirements for personnel to access and work in/on Physical Infrastructure.
- conditions for the provision of forecasts by telecoms providers in respect of their future requirements for PIA.
- the location of Physical Infrastructure or the method by which telecoms providers may obtain information about the location of Physical Infrastructure.
- procedures for the provision of information to telecoms providers about spare capacity, including arrangements for visual surveys of Physical Infrastructure to determine spare capacity.
- conditions for the inspection of the Physical Infrastructure at which access is available or at which access has been refused on grounds of lack of capacity.
- technical specifications for PIA including:
 - technical specifications for permitted cables and associated equipment; and
 - cable installation, attachment and recovery methods.
- the methodology for calculating availability of spare capacity in Physical Infrastructure.
- conditions for reserving capacity that shall apply equally to BT and telecoms providers.
- arrangements for relieving congested Physical Infrastructure, including the repair of existing faulty infrastructure and the construction of new Physical Infrastructure.
- the information that a telecoms provider is required to provide to BT where that telecoms provider is requesting the repair of existing faulty infrastructure and/or the construction of new Physical Infrastructure necessary for SLAs and SLGs.
- Service Level Commitments and Service Level Guarantees in relation to the timescales for BT to respond to a request by a telecoms provider for PIA including where relevant to relieve congested Physical Infrastructure other than a congested Pole, where such a response confirms that the order has been accepted and includes how BT proposes to relieve that congestion.
- Service Level Commitments and Service Level Guarantees in relation to the timescales for completion by BT of any works necessary to relieve congested Physical Infrastructure (including the repair of existing faulty infrastructure and the construction of new physical infrastructure) other than a congested Pole.
- conditions on which telecoms providers may elect to undertake repair or build works on behalf of BT.
- conditions for the installation and recovery of cables and associated equipment.
- technical specifications for PIA, including:
 - technical specifications relevant to the repair of existing faulty Physical Infrastructure.
 - technical specifications relevant to undertaking build works.
- Service Level Commitments and Service Level Guarantees in relation to the timescales for BT to respond to a request by a telecoms provider to undertake works itself to relieve congested Physical Infrastructure.

- Service Level Commitments and Service Level Guarantees in relation to the timescales for BT to respond to a request by a telecoms provider to relieve a congested Pole where such a response confirms that the order has been accepted and how BT proposes to relieve that congestion.
- Service Level Commitments and Service Level Guarantees in relation to the timescales for completion by BT of any works necessary to relieve a congested Pole.
- the arrangements for maintenance of cables and associated equipment installed by telecoms providers and of the Physical Infrastructure, including the provision for the temporary occupation of additional infrastructure capacity for the installation of replacement cables.

6.356 We have also decided that BT should provide PIA Database Access as an ancillary service to the PIA network access remedy.

Legal tests

Requirement to publish a Reference Offer

6.357 In Section 5 Volume 1 of this Statement, we set out why we consider the Reference Offer condition we are imposing, including the requirements set out in this section, meets the various legal tests set out in the Act.

Consistency with the BEREC Common Position

6.358 As set out in Section 5 Volume 1 of this Statement, we have taken utmost account of the BEREC Common Position when making these decisions.⁶⁶⁵

⁶⁶⁵ BoR (12) 127, December 2012. *BEREC Common Position on best practice in remedies on the market for wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location imposed as a consequence of a position of significant market power in the relevant market*, [www.berec.europa.eu/files/document_register_store/2012/12/20121208163628_BoR_\(12\)_127_BEREC_COMMON_POSITION_ON_BEST_PRACTICE_IN_REMEDIES_ON_THE_MARKET_FOR_WHOLESALE.pdf](http://www.berec.europa.eu/files/document_register_store/2012/12/20121208163628_BoR_(12)_127_BEREC_COMMON_POSITION_ON_BEST_PRACTICE_IN_REMEDIES_ON_THE_MARKET_FOR_WHOLESALE.pdf).

7. Implementation timetable

- 7.1 In this section, we set out our decision relating to the timescales by which Openreach is required to implement the various elements of the new PIA remedy as described in this volume of the statement.
- 7.2 At the end of the section, we also address a number of detailed comments made by Openreach relating to the draft legal instruments we proposed to impose on BT in our April 2017 DPA Consultation.

Our proposals

- 7.3 In our April 2017 DPA Consultation we set out proposals to impose a network access obligation on BT requiring it to provide access to its physical infrastructure (including making necessary network adjustments) with effect from 1 April 2018.
- 7.4 Consistent with this, in our August 2017 DPA Consultation we proposed that our associated pricing rules would also apply from 1 April 2018. As such, the requirement on Openreach to provide access to its physical infrastructure (and the requirement to provide necessary network adjustments) based on the proposed price changes, and financial limit, would come into effect on 1 April 2018.
- 7.5 In our April 2017 DPA Consultation we explained that various elements of our proposed PIA remedy would require the development of a new PIA Reference Offer. Furthermore, in several instances we indicated that the practical details relevant to the development of a new PIA Reference Offer would be best taken forwards through discussions between Openreach and industry.
- 7.6 We recognised that discussions between Openreach and industry would take time. However, our view was that without intervention there was a risk that those discussions could become protracted and result in uncertainty for telecoms providers intending to use PIA.
- 7.7 To address the risks identified, we proposed that:
- The OTA2 should facilitate the negotiations.
 - Key milestones should be identified in the development of the new remedy, and dates set by which BT would be required to meet them. More specifically, we proposed:
 - The publication of a draft revised PIA Reference Offer within four months of our Final Statement.
 - The publication of the final PIA Reference Offer within one year of our Final Statement.
- 7.8 In Condition 8.3 of the draft Legal Instruments we identified the specific elements of the PIA Reference Offer that would come into force after 12 months. These elements related to requirements that we proposed should be introduced to the PIA Reference Offer. These comprised of the following:

- Information requirements where a telecoms provider requests a network adjustment;
- SLA and SLG requirements;
- Forecasting requirements; and
- Requirements to allow for self-provisioning by telecoms providers.

Stakeholder responses

- 7.9 Openreach noted that the development of a new PIA Reference Offer will rely heavily on industry discussions. It supported this approach but considered that given the complexity of the proposals in respect of network adjustments, product scope, systems and non-discrimination it expected such discussions to be extensive and time consuming. In relation to network adjustments, and where an external financial liability is placed on Openreach, it highlighted the need to establish a mechanism to plan and control its overall exposure to telecoms provider generated requests. It explained that a mechanism will need to assess whether a works order is invalid, or properly falls within the obligation.⁶⁶⁶
- 7.10 Openreach argued that Ofcom’s proposals take no account of the potential scale of the requirements and the significant impact on Openreach and its external suppliers. It noted that Ofcom’s suggested demand profile for PIA for the next review period (a maximum of one million homes passed) is comparable in size to a single large scale publicly funded project with the challenge exacerbated by demand coming from a number of telecoms providers operating in various geographic locations. Openreach argued that it is not possible to tackle a project of such scale on an order by order basis since internal and external resources and finances would not be available.
- 7.11 Openreach argued, that given the complexity and possible variety of the new arrangements, it was important that Ofcom provides a mechanism in the legal instruments that enables Ofcom to extend the timetable for the Reference Offer to be published and implemented should it be required, and where agreed with relevant stakeholders.
- 7.12 Openreach considered that the timescales for publication of a new PIA Reference Offer should be extended to 18 months.⁶⁶⁷
- 7.13 CityFibre considered that implementation of a ‘good enough’ PIA remedy by 2018 would be preferable to a perfect one that only becomes available in the next decade. It highlighted the importance of early agreement on SLAs and SLGs relating to build works and progress for a workable solution on overhead lead-ins.⁶⁶⁸
- 7.14 TalkTalk suggested that Ofcom should set more ambitious implementation timescales given PIA has been provided for several years; there has been an expectation that

⁶⁶⁶ Openreach also made arguments about ensuring network adjustments are of benefit to itself. We deal with stakeholder comments relating to the scope of the network access requirement, including making necessary network adjustments in Section 2.

⁶⁶⁷ Openreach response to the April 2017 DPA Consultation, pages 9 to 11.

⁶⁶⁸ CityFibre response to the April 2017 DPA Consultation, page 51.

improvements would be necessary since Ofcom's Strategic Review was published in February 2016; and Openreach has already made some progress with its improvements.⁶⁶⁹

Our reasoning and decisions

- 7.15 In light of Openreach's and other stakeholder responses to our consultations we have re-examined our proposals and given consideration to the practical implications of the following:
- The requirement for Openreach to implement the network access obligation (either in full or in part) by 1 April 2018 and in advance of the final PIA Reference Offer; and
 - The requirement to develop a Draft Reference Offer and a Final Reference Offer within four months and 12 months respectively from the publication date of our Final Statement more generally.

Implementation of the network access requirement

- 7.16 In this Statement we have made various decisions that represent changes to the scope and detail of Openreach's existing network access requirement for PIA.
- 7.17 We recognise that because of the changes we are making to Openreach's network access requirement, in some cases Openreach will be required to undertake a set of activities and/or develop new internal processes relevant to fulfilling and complying with its new regulatory obligations. We anticipate that, as part of developing those new processes, Openreach will also need to consider how its current processes used for PIA can be further automated (and integrated with any new processes) to allow for PIA to be used for large scale network deployments. Developing these new processes will take some time and we consider should be factored into our decision relating to when elements of the network access requirement should come into effect.
- 7.18 Notwithstanding this, we are mindful that BT is currently subject to a PIA obligation in relation to which Openreach already has established processes and procedures. Although new processes will need to be developed in some instances, in other cases, either existing PIA processes can be used, or existing processes can be built on, or easily adapted, in order to meet the new requirements. Therefore, we consider Openreach's ability to build on current processes (or rely on existing processes, either in the long-term or on a temporary basis) is a relevant factor in assessing the timescales needed for Openreach to implement aspects of its network access requirement.

Elements of the network access requirements to be effective by 1 May 2018

- 7.19 Our view is that the following elements of the network access requirement can be implemented either using existing processes and/or without Openreach being required to undertake an extensive set of new activities as part of its implementation:

⁶⁶⁹ TalkTalk response to the April 2017 DPA Consultation, page 11.

- The requirement for Openreach to offer access to its physical infrastructure, including the obligation to provide network adjustments.
- The requirement for Openreach to offer access to its network records to PIA users via an electronic database.
- The changes to PIA rental prices as set out in Section 5 and changes to ancillary prices identified as productisation activities in Section 5.

7.20 In Section 2, we set out our decision relating to allowing PIA to be used for the provision of non-broadband services where the primary purpose is for the provision of broadband services (i.e. mixed usage). Our view is that although this requirement represents a change to the scope of the current PIA product, Openreach has an existing set of internal processes that can be used, or easily modified, that will allow it to ensure that PIA customers are using PIA for purposes in accordance with the scope of the new requirement. More specifically, Openreach currently has an internal process for auditing whether its PIA customers are using PIA for the purposes of providing broadband services only (as part of complying with the specification of the existing PIA product).

7.21 Therefore, for the requirements set out in paragraph 7.19, we have decided that, to allow for Openreach to make any necessary administrative changes to the existing PIA Reference Offer⁶⁷⁰ to implement our decisions, these will come into effect by 1 May 2018.

Elements of the network access requirement to be effective by 1 April 2019

7.22 In Section 4, we set out our decisions relating to the establishment of a financial limit and on how the costs of those network adjustments falling within the financial limit must be recovered. In the April 2017 DPA Consultation, we proposed that the financial limit and consequential cost recovery rules would come into effect on 1 April 2018 alongside the other PIA pricing obligations.

7.23 Openreach argued that because of these changes an external financial liability is placed on Openreach and therefore it will be necessary for it to establish a mechanism to plan and control its overall exposure to requests generated by telecoms providers, as well as assessing whether a works order is invalid, or properly falls within the obligation.

7.24 Although BT is currently subject to a PIA obligation in relation to which Openreach already has established processes and procedures which can be used for network adjustments, the costs of such activities are recovered directly from the telecoms provider requesting the network adjustment. We recognise that the introduction of the financial limit is a change which means that Openreach must incur the cost of network adjustments falling within the financial limit upfront and recover these costs over all users of the infrastructure. Therefore, we accept that this change to how costs are recovered means that Openreach will need to make more than minor changes to its current processes and procedures, including:

⁶⁷⁰ We anticipate that Openreach will need a short time to make adjustments to the PIA contract, product description, the price list, and other associated documentation.

- Agreeing the set of information that is required from a telecoms provider in support of a network adjustment request (as part of developing the new PIA Reference Offer, and through industry discussion); and
 - Establishing a set of processes (that will need to be developed, agreed, documented and implemented) for assessing the validity of the network adjustment request that will also include a process for measuring the costs against the financial limit.
- 7.25 Therefore, having considered Openreach’s argument, our view is that these processes and procedures which are driven by the introduction of the financial limit will take some time to develop. Accordingly, we have decided that our decision around the establishment of the financial limit (including how the costs of network adjustments are recovered) should come into effect by 1 April 2019.
- 7.26 As explained above, we have decided that the requirement to make network adjustments will apply from 1 May 2018. This means that from that point up until the financial limit enters into force, the costs of network adjustments will continue to be recovered directly from the telecoms provider requesting the adjustment, the charges for which will be set in accordance with our basis of charges condition.

Timetable for developing the new PIA Reference Offer

- 7.27 As explained above, we consider that Openreach should have one month from the publication of the Final Statement to make any necessary administrative changes to the existing PIA Reference Offer to implement certain of our decisions. However, there are certain other changes that we are requiring to the existing PIA Reference Offer which require industry engagement and which we proposed in our April 2017 DPA Consultation would come into force later.
- 7.28 In this sub-section, we provide our decisions on the timescales needed to implement these further changes to the PIA Reference Offer through the development of a draft PIA Reference Offer and a final revised PIA Reference Offer relevant to the following requirements (as set out in Section 6).
- Forecasting;
 - Arrangements relating to requests for Openreach funded network adjustments;
 - The introduction of SLAs and SLGs (in relation to both responding to order requests and completing network adjustments);
 - Arrangements relevant to self-provisioning by telecoms providers.
- 7.29 As explained above, in the April 2017 DPA Consultation, we proposed that these elements should be required as part of a new PIA Reference Offer that would come into force after 12 months.
- 7.30 Stakeholders had differing views regarding our proposals for developing a revised PIA Reference Offer. Openreach suggested that we extend the timetable to 18 months while TalkTalk argued that it should be finalised earlier.

- 7.31 We continue to consider that there are a number of practical issues relevant to the PIA Remedy (and the development of the PIA Reference Offer) that we consider industry are well placed to take forwards. We consider that these issues will take time to discuss and resolve. While we acknowledge that Openreach already offers a Duct and Pole access product in the form of PIA and that discussions around developing a new Reference Offer can start from the base of the existing Reference Offer, we also consider that there will need to be extensive discussions around the elements we identify above. Our view is that bringing forward the timetable to agree either the Draft Reference Offer or the Final Reference Offer would be challenging and would not allow industry sufficient scope and time to fully discuss and agree issues relevant to our decisions and guidance.
- 7.32 Notwithstanding this, we also consider it imperative to deliver improvements as soon as possible in order to implement our full set of decisions on PIA to support the deployment of competing broadband networks. While Openreach refers to the complex nature of the industry discussions, we also consider that telecoms providers that are party to those discussions will have strong incentives to work through efficiently and progress the technical and practical details of our proposed remedy.
- 7.33 In light of the above, we have concluded that the following reflects an appropriate timetable which provides the right balance of allowing industry sufficient time to agree the details of the Reference Offer and having improvements in place in respect of those requirements set out at paragraph 7.28 above:
- a Draft PIA Reference Offer to be agreed by 1 August 2018; and
 - a Final PIA Reference Offer to be published by 1 April 2019.
- 7.34 Openreach has suggested that Ofcom provides a mechanism in the legal instrument that enables Ofcom to extend the timetable for the PIA Reference Offer to be published and implemented, should it be required and agreed with Ofcom and the relevant stakeholders. While we recognise that unforeseen issues may arise during the discussions around developing the new PIA Reference Offer, we consider that the timetable we have set is a proportionate approach to allow for such issues to be resolved. Nevertheless, we will monitor the progress of discussions around the development of the new PIA Reference Offer and consider amending the timetable based on the circumstances at that time, if necessary, using existing provisions in the legal instruments.
- 7.35 In our April 2017 DPA Consultation, we proposed that Conditions 8.3B(b)(iii) of the draft Legal Instrument would come into effect 12 months after the publication of the Final Statement. Draft Condition 8.3B(b)(iii) requires that the PIA Reference Offer includes technical specifications relevant to the repair of existing faulty physical infrastructure.
- 7.36 Since Openreach currently allows telecoms providers the ability to undertake enabling works (specifically in relation to duct infrastructure) we now realise that it is not necessary

to delay the implementation this aspect of Condition 8.3B(b)(iii) of the draft Legal Instrument⁶⁷¹ to 12 months after the publication the Final Statement.

- 7.37 Therefore, Condition 8.3B(b) now separates technical specifications relevant to the repair of existing faulty Physical Infrastructure (Condition 8.3B(b)(iii)) from technical specifications relevant to the build of physical infrastructure (Condition 8.3B(b)(iv)). We have decided that Condition 8.3B(b)(iii) should come into effect by 1 May 2018 with Condition 8.3B(b)(iv) coming into effect 12 months after publication of this statement.

The role of the OTA2

- 7.38 We recognise that progress in developing a new PIA Reference Offer will require well managed discussions between Openreach and telecoms providers. We have decided that the OTA2 is best placed to facilitate those discussions given its experience and expertise in progressing other negotiations between telecoms providers.
- 7.39 Ofcom intends to have oversight of the progress that is being made as part of those discussions and will liaise with the OTA2 accordingly. Improving access to Openreach's physical infrastructure for the purposes of furthering competition in full-fibre broadband services is a strategic priority for Ofcom. Therefore, if issues arise during industry negotiations relating to developing the new PIA Reference Offer that require our input, we will provide our full support.

Openreach's comments on the draft legal instruments

- 7.40 Annex 8 of the April 2017 DPA Consultation and Annex 6 to the August 2017 DPA Consultation set out draft legal instruments we proposed to impose on BT.
- 7.41 Openreach provided detailed comments in response to the April 2017 DPA Consultation. To the extent that these comments are not dealt with elsewhere in this statement, these are addressed below. Vodafone also made comments about the draft legal instruments. We consider these are addressed earlier in this Statement.

Definition of Physical Infrastructure

- 7.42 Openreach said that the proposed definition of "Physical Infrastructure" in draft condition 2.1 (d) was too widely drafted and vague. In its view, it was now clear that the key physical infrastructure which should be subject to the PIA remedy is BT's poles, ducts, joint boxes and man holes. Moreover, the proposed definition encompassed infrastructure such as tunnels that BT cannot provide access to, or information about, due to security concerns. Openreach also suggested the definition should be amended to make clear that the PIA remedy only applies to infrastructure that BT owns and controls.⁶⁷²

⁶⁷² Openreach response to the April 2017 DPA Consultation, page 77.

- 7.43 We do not consider that the definition of “Physical Infrastructure” should be limited to a specified subset of infrastructure. The Access Directive and ATI Regulations both define Physical Infrastructure through a non-exhaustive list. We have however amended our definition to provide increased clarity. While acknowledge that security concerns may apply to the use of physical infrastructure in certain cases, these concerns do not relate to what is or is not physical infrastructure therefore we consider that they should be addressed in the drafting of the SMP conditions not the definition. Also, although this definition is not limited to infrastructure that BT owns and controls, the PIA obligation only requires BT to give access to its own infrastructure.

Definition of Third Party

- 7.44 Openreach was concerned that the term Third Party, used to describe telecoms providers in the draft SMP conditions was not fit for purpose given the intrusive nature of the proposed PIA remedy and the competition law risk associated with competitors accessing confidential infrastructure information. Openreach suggested that Third Party should be replaced with a new term “PIA Purchaser” defined as “a person providing a public electronic communications service or a person providing a public electronic communications network that is properly established with the Dominant Provider as a customer for Physical Infrastructure Access products and is acting for the sole purposes of purchasing Physical Infrastructure Access from the Dominant Provider”.⁶⁷³
- 7.45 The Reference Offer condition that we are imposing allows Openreach to set appropriate conditions for Third Parties to gain access to Physical Infrastructure. In addition, Condition 2 only requires access to be provided “for the purposes of deployment of broadband access networks”. We therefore consider that the SMP conditions as drafted allow for establishment conditions and limit use of the remedy such that the suggested amends to the definition of “Third Party” are unnecessary.

Definition of Physical Infrastructure Access

- 7.46 Openreach said that the definition of Physical Infrastructure Access in draft condition 2.1 (d) did not appear to achieve Ofcom’s intended aim in relation to ‘mixed usage’. The term ‘end-user’ as defined in Section 151(1) of the Communications Act 2003 encompasses businesses as well as individuals. Consequently, the proposed definition would allow PIA to be used primarily for the provision of leased lines to businesses, contrary to Ofcom’s intention. Openreach suggested the definition be amended to refer to residential end-users.
- 7.47 The condition we are imposing limits the use of the remedy to the deployment of primarily broadband access networks. This is sufficient to ensure that a deployment consisting of primarily leased lines is outside the scope of the remedy. As explained in Section 2, our intention is not to prevent services being supplied to business end users where the usage rule is met.

⁶⁷³ Openreach response to the April 2017 DPA Consultation, pages 77 to 78.

Definition of PIA Database Access

- 7.48 Openreach suggested that the definition of PIA Database Access in draft condition 2.2 (i) should be amended to remove the reference to ‘the most up to date information’. Openreach noted that while it would provide telecoms providers with the most up to date information available in the PIA Digital Map Tool, it might not always be the most up to date information held by BT because there would sometimes be a time lag between Openreach being informed of updated information and it being processed and uploaded to the PIA Digital Map Tool.⁶⁷⁴
- 7.49 We accept that there may on occasion be a short time lag before information is uploaded to the PIA Digital Map Tool and we have made clear in condition 2.2 (i) that the information must be up to date “as far as reasonably practicable”.

Reference Offer conditions concerning provision of information about physical infrastructure

- 7.50 Openreach said that its infrastructure information is not and cannot be completely accurate. It therefore suggested that draft condition 8.3B (a) (which would require the PIA Reference Offer to include information about the location of physical infrastructure or the method by which Third Parties may obtain information about the location of Physical infrastructure) be modified to refer to the available information.⁶⁷⁵
- 7.51 We recognise that BT can only provide the information it has available to it and in some circumstances, this may contain inaccuracies. However, given this is a requirement to include certain provisions in the Reference Offer, not a requirement to provide information, we do not consider it is necessary to make the change suggested by Openreach.

SLAs and SLGs

- 7.52 Openreach raised several concerns about draft conditions 8.3B (m) and 8.15 concerning the requirement for the PIA Reference Offer to include SLAs and SLGs for works to relieve congested infrastructure in addition to the comments raised more generally on SLAs and SLGs:
- Openreach said that the requirement to make adjustments should be limited:
 - Openreach should only be required to accept requests that are reasonable, necessary and which contain all the necessary information for Openreach to evaluate the request;
 - Openreach would need to be able to prevent gaming tactics such as telecoms providers saving up requests so that Openreach would be unable to meet the SLAs; and

⁶⁷⁴ Openreach response to the April 2017 DPA Consultation, page 78.

⁶⁷⁵ Openreach response to the April 2017 DPA Consultation, page 79.

- Openreach should not be obliged to accept orders in full as they are submitted by telecoms providers.
 - The proposed conditions would limit Openreach’s flexibility to decide whether to accept requests to relieve congested infrastructure based on reasonable contract terms. Openreach proposed that the condition should be modified so that it would be required to offer SLAs and SLGs for its response to requests to relieve congestion rather than for its acceptance of such requests.
 - Openreach noted that draft condition 8.2 (which sets out Reference Offer conditions applicable to all forms of network access) also appeared to contain Reference Offer conditions relating to SLAs and SLGs and suggested we modify the condition to explicitly exclude PIA.
 - Openreach suggested the definition of Pole in condition 8.15 should be modified to make clear that it relates only to poles owned and controlled by Openreach.⁶⁷⁶
- 7.53 On Openreach’s point that the requirement to make network adjustments should be limited, we have revised our guidance on the scope of the PIA to give greater clarity. On the points of detail as to the operation of the SLAs and SLGs raised by Openreach, we note that it will be for Openreach to agree such details with industry in the first instance.
- 7.54 We recognise that it may be appropriate for Openreach to reject an access request where it is not in scope. We have therefore, amended this condition to allow for this.
- 7.55 We have also made clear that the requirements in condition 8.3B are incremental to those in condition 8.2 rather than duplicative.
- 7.56 We have amended the definition of Pole to make clear that this only applies to Poles forming part of the Dominant Provider’s Physical Infrastructure.

⁶⁷⁶ Openreach response to the April 2017 DPA Consultation, pages 80 to 81.