

#### SKY'S RESPONSE TO OFCOM'S

#### PRELIMINARY CONSULTATION ON PASSIVE REMEDIES DATED 5 NOVEMBER 2014

This is Sky's response to Ofcom's "Preliminary consultation on passive remedies" dated 5 November 2014 ("the Consultation").

#### 1. Executive Summary

- 1.1 Requiring BT to offer wholesale access to its infrastructure such as its ducts, poles and dark fibre ("passive" access) will significantly benefit businesses and consumers because, by promoting greater investment deeper in the network and exposing more of the value chain to competition, there are likely to be improved levels of innovation, product differentiation, cost control, price competition and service quality.
- 1.2 Currently, investment and competition are often constrained by the regulated wholesale "active" products that BT provides (via Openreach) because it controls the precise specification, pricing, equipment and service characteristics. This level of control can be inefficient. For example, Local Loop Unbundling ("LLU") operators ("LLUOs") like Sky, are forced into a continual, costly cycle of network upgrades and are constrained in their network design. Burgeoning demand for bandwidth – in part driven by increased adoption of superfast broadband – amplifies these inefficiencies and further supports the case for regulated passive access. These inefficiencies would become even more prevalent, if BT merges with EE (or, in the alternative, O2) because BT's market power and incentives to provide active products that are more favourable to its downstream divisions would increase further.
- 1.3 The benefits of a passive access remedy are maximised where: (i) there are no limits to where it can be used or for what purpose; (ii) access is available to both BT's ducts and poles, and to its dark fibre; and (iii) BT's passive products are fit for purpose. While the detail of some of these efficiencies can be forecast today, it is not necessary, appropriate or fair to identify now the precise form of all these benefits.
- 1.4 The potential issues regarding passive remedies highlighted by Ofcom are not sufficiently significant to outweigh the benefits that are likely to result from fit for purpose passive access. This is because: (i) concerns that BT may not recover its common costs only relate to forecast uncertainty a regular issue with which Ofcom deals when setting charge controls and could equally result in over-recovery by BT; (ii) the potential temporary harm that may arise from higher prices for lower bandwidth leased lines is likely to be small compared to the benefits of a more efficient bandwidth pricing structure and the dynamic efficiencies that will ultimately deliver lower prices and better products for consumers of those services; and (iii) the scope for arbitrage is relatively immaterial.
- 1.5 The remainder of this response comprises the following sections:
  - Section 2: Current Business Connectivity Market Review ("BCMR") remedies limit innovation and investment
  - Section 3: Passive remedies would address the limitations of current active remedies
  - Section 4: The scope and design of passive remedies
  - Section 5: Impact of pricing remedies on BT
  - Annex 1: Usage cases for regulated passive access

# 2. Current Business Connectivity Market Review ("BCMR") remedies limit innovation and investment

- 2.1 The current remedies applied to business connectivity markets constrain the scope for communication providers ("CPs") to invest and innovate and this has had a detrimental impact on consumer and business welfare. For instance, BT controls the precise specifications and pricing of its active products, which has:
  - (a) forced Sky into repeated inefficient and costly network upgrades;
  - (b) inefficiently constrained the use of the underlying physical infrastructure thus limiting CPs' network design and innovation; and
  - (c) distorted the competitive supply of business connectivity including backhaul.
- 2.2 The detrimental impact on welfare would likely increase if BT's potential merger with EE (or, in the alternative, O2) was completed without any further regulatory remedy.

#### Current active remedies have led to inefficient and costly network upgrades

- 2.3 Openreach's active products are designed such there are steep pricing tiers as capacity increases which are significantly above incremental cost. LLUOs must therefore continually upgrade their backhaul networks to meet the rapid growth in both broadband data consumption and subscriber volumes a trend which is expected to continue. This is costly and disruptive to customers and limits demand for high bandwidth links.
- 2.4

#### The design of active products constrains innovation

- 2.5 As Openreach mandates its own network termination equipment ("NTE") on its active products, CPs cannot access the full capacity of the underlying fibres, and hence cannot invest in their own NTEs to manage capacity optimally, lower costs and improve quality of service. Similarly, as a result of Openreach's active product restrictions (such as arbitrary "hop count" and circuit distance rules), CPs are unable to implement network architectures optimised for resilience, cost and bandwidth efficiency and video content distribution.
- 2.6 Reduced innovation and choice in network architecture and equipment has led to:
  - (a)
  - (b) increased costs of traffic aggregation; and
  - (c) inefficient metro network capacity upgrades.

### BT's active products distort the competitive supply of backhaul

- 2.7 Competition in the supply of LLU backhaul is not fully effective and, as a result, Openreach's backhaul products have strong influence over the pricing and functionality offered by its competitors.
- 2.8
- 2.9 LLUOs have limited choice in backhaul services because:
  - (a) competing suppliers typically benchmark their offers to the Openreach portfolio;

- (b) there is limited product differentiation, choice and innovation compared to Openreach's solutions; and
- (c) alternative suppliers cannot offer the same level of coverage to Openreach with its unique national network.

# A merger of BT and EE (or O2) will be detrimental to consumer and business welfare

- 2.10 BT's potential merger with EE (or, in the alternative, O2) could further strengthen BT's business connectivity market power should EE's significant demand for business connectivity products (such as mobile base station backhaul) no longer be contestable. It would also increase BT's incentives to provide active products that favour its downstream divisions at the expense of its competitors.
- 2.11 As such, requiring BT to offer passive access is an important step in enabling all CPs to compete effectively such that consumers and businesses benefit.

### 3. Passive remedies would address the limitations of current active remedies

- 3.1 Regulated passive access to BT's infrastructure could address the problems set out above and provide significant benefits to businesses and consumers. Promoting effective and sustainable competition across more of the value chain could lead to greater investment in alternative infrastructure and more innovation which in turn will result in higher levels of product differentiation, price competition, cost minimisation and service quality.
- 3.2 For purchasers of backhaul in particular, passive access will bring more effective competition and deliver solutions that are more efficient in keeping pace with the rapid growth in data consumption.
- 3.3 The success of LLU provides a clear example of the consumer and business benefits that can result from effective passive remedies and of the potential for future deregulation.

# Passive access can promote effective, sustainable competition across more of the value chain

- 3.4 Appropriately regulated passive access could reduce barriers to entry and, consequently, unlock opportunities to invest in alternative network infrastructure. This would increase choice to CPs and provide more alternatives to Openreach's rigid network structure and service offerings.
- 3.5 With unconstrained access to BT's ducts, poles and dark fibre, CPs will be able to deploy their own cable and/or active equipment to configure flexible and efficient networks which are significantly less constrained by BT's network topology. This, in turn, will enable the delivery of services that put CPs' customers first rather than bending customer requirements to fit around BT's fixed network topology, product specifications and pricing. As a result, this will bring greater product differentiation, choice, quality and lower prices to customers.
- 3.6 Service quality in particular can be expected to improve. Poor service performance has been persistent and BT has very limited incentives to improve.<sup>1</sup> Access to passive infrastructure and investment in alternative infrastructure will give CPs greater control over service quality, and hence a further product characteristic upon which to compete with Openreach's active products.
- 3.7 The availability of passive access will enable CPs to provide alternatives to Openreach's active products and over time competition and greater choice will reduce the reliance on these products. As a result, passive remedies could lead to the gradual removal of regulation downstream at the active layer.

<sup>&</sup>lt;sup>1</sup> See Annex 1 of Sky's response of 16 June 2014 to Ofcom's Call for Inputs dated 1 April 2014 for examples of problems with the quality of service of BT's active products; and response to question 2 in Sky's submissions of 29 October 2014 to Ofcom's 2<sup>nd</sup> section 135 information request dated 1 October 2014.

# The success of LLU provides a clear example of the benefits of passive remedies

- 3.8 LLU is the best example of the benefits of passive access where it transformed the UK's fixed communications markets. On the foundations of equivalent physical access and regulated common pricing for all CPs, it resulted in a significant increase in choice and quality for consumers.
- 3.9 LLU has:
  - (a) attracted significant investment from CPs who otherwise would have had little or no opportunity to do so;
  - (b) delivered a significant expansion of choice for consumers with three or more CPs available (or forecast to be available) to around 90% of UK premises for broadband services<sup>2</sup>;
  - (c) delivered better services to consumers for example by CPs rolling out faster broadband services based upon ADSL2+ which resulted in BT responding by upgrading its own network to meet the increased competition; and
  - (d) while initially LLU was introduced alongside active remedies, it ultimately led to their widespread removal (i.e. in areas serving over 90% of UK premises).

# 4. The scope and design of passive remedies

- 4.1 To unlock fully the potential benefits of passive access, passive remedies should:
  - (a) be unconstrained in terms of geography and downstream application;
  - (b) include access to both ducts and poles, and dark fibre;
  - (c) be fit for purpose; and
  - (d) not be solely dependent on proven demand ahead of their introduction.
- 4.2 This is because investment in network infrastructure, even where passive remedies lower barriers to entry, is likely to feature long payback periods and will be largely dependent upon maximising scale and scope economies. Further, for passive remedies to be a success, the accompanying product design and associated processes need to be industrialised such that they are fit for purpose.
- 4.3 While some of the benefits of passive access can be identified today, it is not necessary or possible to establish definitively all demand as a prerequisite for mandating passive access. As shown by LLU, when BT has been required to provide passive access many of the resulting dynamic efficiencies were not foreseen.

### Passive remedies should be unconstrained

- 4.4 For passive remedies to deliver fully their potential benefits, they should be unconstrained, i.e. without:
  - (a) geographic constraints on their availability;
  - (b) limits to the type or use of downstream products that are supported by passive products; or
  - (c) contractual restriction of the purchase, packaging, selling or reselling of products.
- 4.5 This will allow CPs to develop a broad suite of services in order to maximise the scale and scope efficiencies of their investment using passive access. For example, any profitable investment in Next Generation Access ("NGA") networks is likely to require those networks

Paragraphs 1.7, 1.23 of Ofcom's Review of the wholesale broadband access markets, Statement on market definition, market power determinations and remedies, 26 June 2014 ("2014 WBA statement), <u>http://stakeholders.ofcom.org.uk/binaries/consultations/review-wba-markets/statement/WBA-Statement.pdf</u>

to support both residential and business communications products, as is evident from the way in which both BT and alternative network operators<sup>3</sup> have deployed their NGA networks to date. Any restrictions on the use or geography of passive access will reduce any of these efficiencies of scale or scope and thus undermine the investment case.

- 4.6 The example of LLU supports the case for introducing unconstrained passive access remedies and provides a roadmap for the design of those remedies in business connectivity markets.
- 4.7 While LLU was introduced primarily to address the needs of the residential broadband market, there are no constraints placed on usage in terms of the downstream products provided over LLU. For example, LLU is used to deliver:
  - (a) both traditional broadband or superfast broadband;
  - (b) fixed voice telephony; and
  - (c) high capacity business Ethernet services (usually deployed through the bonding of multiple copper pairs and often described as "Ethernet in the first mile").

This lack of restriction has enabled LLUOs to maximise their scale and scope efficiencies and hence has been instrumental in the success of the remedy.

4.8 This is in stark contrast to the constrained passive remedy, Physical Infrastructure Access ("PIA"), which Ofcom obliges BT to provide for the purposes of deploying alternative Next Generation Access ("NGA") networks. This remedy limits the scope of downstream services that can use PIA to fixed broadband, fixed telephony and cable TV, while crucially excluding leased lines and mobile backhaul.<sup>4</sup> PIA is an example of how restrictions on usage (on top of onerous administrative terms and high pricing) can limit take up.

# Access to ducts, poles and dark fibre are complementary remedies

- 4.9 Access to ducts, poles and dark fibre are suited to different circumstances and all these types of access are likely to be necessary to optimise an investment business case in alternative network infrastructure. For example:
  - (a) access to ducts and poles is likely to be the preferred for Fibre-to-the-Premise ("FTTP") roll-out or for CPs wanting to connect to small exchanges that are c.2-3km away from the nearest Point of Presence ("POP") (because relatively short fibre pulls could be economically viable and practical); and
  - (b) dark fibre would be preferable for longer point-to-point links, where access to ducts and poles would be more complicated or costly.

The potential usage cases in passive access remedies demonstrate that access to ducts and poles and to dark fibre are complementary forms of passive access. Annex 1 sets out these examples in more detail.

# Any passive access products need to be fit for purpose

- 4.10 As highlighted above, low PIA take up has arguably resulted from restrictions on use, onerous terms and high pricing. Similarly LLU take up in its early years (prior to 2005) was limited because of high prices, lack of process industrialisation and unfavourable contractual terms. This demonstrates the importance of regulated access being offered on terms and conditions that are conducive to significant take up. Therefore, Ofcom must ensure sufficient transparency of product availability and specification, fair and reasonable cost orientated pricing and flexibility of use.
- <sup>3</sup> For example, City Fibre, TalkTalk and Sky partnership in York

<sup>&</sup>lt;sup>4</sup> See paragraphs 1.23, 7.64, 7.65 in Ofcom's Statement on the Review of the wholesale local access market of 7 October 2010, <u>http://stakeholders.ofcom.org.uk/consultations/wla/statement.</u>

- 4.11 For example it is important that:
  - (a) CPs have direct access to BT network records systems for ducts, poles and cables;
  - (b) there is a space reservation scheme to ensure customer premises connection;
  - (c) there is a process for exchanging excess copper capacity for fibre where passive infrastructure is exhausted; and
  - (d) the cost allocation methodology where passive infrastructure upgrades are needed is fair and reasonable.

## Demand for passive access does not need to be proven fully ahead of introduction

- 4.12 While some of the applications and resulting benefits of passive remedies can be forecast today, it is not possible to identify them all because future uses and efficiencies will only become apparent once CPs have had the opportunity to invest and innovate around regulated passive access products. It is not necessary, appropriate or fair for Ofcom to predicate its decision on whether to impose passive remedies solely on the identifiable uses today.
- 4.13 In the same way that LLU has proved successful, Ofcom should instead consider the wider benefits which will flow from the unconstrained use of the remedies but which have yet be fully identified.
- 4.14 However, all the usage cases considered by Ofcom in the Consultation are possible and likely to be implemented. Greater choice in mobile and LLU backhaul, the development of business grade broadband and unlocking residential FTTP services all represent opportunities to maximise any investment using passive remedies.
- 4.15 In any case, a number of CPs, including Sky, have shown a very strong interest in passive access (including submitting a joint response to the Consultation as members of the Passive Access Group) and therefore, provided the remedy is designed in the right way, it is likely that take up will be high and passive access will deliver greater competition in the supply of business connectivity services (including backhaul) as well as in the supply of NGA based services.

# 5. Impact of pricing remedies on BT

- 5.1 Ofcom raises a number of concerns regarding the impact of passive remedies on BT including: the ability of BT to recover its common costs; the impact of passive access on the pricing structure of existing active products; and the possibility of CPs taking advantage of arbitrage opportunities at the expense of BT. Sky considers each of these concerns are not sufficient to counter the significant benefits that passive access would introduce:
  - (a) the issue of common cost recovery relates to uncertainty in demand forecasts a regular issue with which Ofcom deals when setting charge controls and could equally result in over-recovery by BT;
  - (b) the potential temporary harm that may arise from higher prices for lower bandwidth leased lines is likely to be small compared to the benefits of a more efficient bandwidth pricing structure and the dynamic efficiencies that will ultimately deliver lower prices and better products for consumers of those services; and
  - (c) the scope for arbitrage is relatively immaterial.

### Recovery of common costs

5.2 Of com raises a concern regarding the impact of passive products on BT's ability to recover its efficiently incurred common costs. However, equally BT could over-recover its common costs because the uncertainty in the level of common cost recovery is due to the risk of short term demand forecasting errors - which are often present in other charge controlled markets. It would be wholly inappropriate to forego the long term benefits of passive products on the basis of these short term risks.

- 5.3 Active business connectivity products are currently price-controlled at a basket level (with sub-caps imposed on individual products), allowing Openreach some flexibility in pricing individual products within the basket. This has resulted in Openreach pricing low bandwidth products below their Fully Allocated Costs ("FAC") and high bandwidth products priced above FAC. High bandwidth products therefore currently contribute more to common cost recovery than low bandwidth products.
- 5.4 The introduction of passive remedies is likely to reduce the demand for expensive high bandwidth active services, if they are priced above FAC, as CPs could use passive inputs instead to self-supply high bandwidth services more cheaply. This would lead to BT recovering less of its common costs from those specific high bandwidth active products and more from the passive products used as substitutes.
- 5.5 In the short term, the level of common costs attributed to the Openreach product baskets that include active products and those including passive products will be based on forecast demand for those products and could therefore be subject to forecast error. As a result, if actual demand for the active or passive products is lower (or higher) than forecast then there is a risk that Openreach will under-recover (or over-recover) its common costs allocated to the respective baskets.
- 5.6 However, this is an issue that Ofcom faces when setting cost based charges in all markets and is not unique to business connectivity markets.
- 5.7 In the long term, the demand for passive products will become established and more stable, and the common cost allocation to product baskets will be less prone to error such that the risk of material under- or over-recovery is much lower.

## Price rebalancing

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- 5.8 Of com also raises the concern that a fall in demand for high bandwidth active products as CPs start to self-supply some of these services using passive remedies could lead to a rebalancing of prices for active products to ensure common cost recovery through:
  - (a) price reductions for high bandwidth active services (where BT may face more competition);
  - (b) price increases for services for which BT faces less competition (likely to be low bandwidth services); or
  - (c) geographic de-averaging of prices.
- 5.9 Sky set out in its response to Ofcom's Call for Inputs<sup>5</sup> its concerns that the current structure of pricing for active products means that the high bandwidth products do not reflect their cost of provision.
- 5.10 A rebalancing of prices for active products may be an efficient and a likely outcome in the long run. For instance:
  - (a) absent access to passive products, demand for high bandwidth active products which make relatively larger contributions to common costs will continue to increase such that a rebalancing of active product prices would occur anyway in order to avoid over-recovery of those common costs; and
  - (b) unconstrained passive products would introduce more competition in the supply of active business connectivity products so that prices are more likely to reflect costs.

See section 4 in Sky's response of 16 June 2014 to Ofcom's Call for Inputs dated 1 April 2014.

5.11 Of greater benefit in the long term is the prospect that increasingly important high bandwidth services would be provided at prices which more closely resemble costs by CPs that are able to differentiate products. Further, the dynamic efficiencies that would result from unconstrained passive access are likely to include a proliferation in the availability of cheaper substitutes for low bandwidth leased line services such as those based upon Fiber to the Cabinet ("FTTC") and FTTP.

#### Arbitrage opportunities for passive remedies

- 5.12 Of com notes that there is a risk of passive products introducing the opportunity for arbitrage whereby CPs could "cherry-pick" only the most profitable products and locations to use passive access to compete with BT.
- 5.13 Sky considers that although this is a risk, it is small when compared to the wider long term benefits that passive inputs could provide.

### Cost based pricing approach

- 5.14 Sky considers a cost based pricing approach for passive remedies to be preferable to an approach based on the retail price of similar downstream active products, less the estimated cost of active components (an "active minus" approach). A cost based approach is more likely than an active minus approach to deliver product and price innovation, and therefore to unlock fully the benefits of passive remedies.
- 5.15 Cost based pricing would allow CPs to use passive inputs to develop new services unrestricted by the specifications or price of the current suite of active products offered downstream by BT. In contrast, an active minus pricing approach would mean that the price of passive inputs would be based on the retail price of a specific BT downstream reference product.
- 5.16 Where CPs would compete by offering simple substitutes for BT's downstream products, the relevant BT service to use as a reference could be relatively simple to identify. However where CPs aim to use passive inputs to provide new products or different product specifications, that are not offered by BT, an active minus approach would introduce significant complexity and uncertainty over the relevant downstream reference product and therefore the wholesale price. BT would have the incentive to refer to the most expensive active product, potentially limiting investment and innovation by other CPs.
- 5.17 This concern could be addressed by limiting the downstream use of passive remedies; however this would allow BT significant control over the products in the market, and would nullify the potential for product innovation by other CPs and all its associated benefits.
- 5.18 An active minus approach would also afford BT significant influence over both the retail price and wholesale costs for business connectivity products, as its data would form the basis for Ofcom's estimates of the "active component" costs. This influence would undermine the opportunities for price innovation from other CPs that arise from cost based pricing, as BT would have significant control over pricing in the market as a whole.
- 5.19 An active minus approach may allow BT to keep consistency in the tariff gradients between active and passive products, somewhat addressing Ofcom's concerns regarding arbitrage opportunities (which Sky considers to be small). However, this small benefit of an active minus approach would be outweighed by detrimental impact of the removal of the opportunities and incentives to innovate under cost based pricing, and their long term benefits.

8 January 2015

# Annex 1 - Usage cases for regulated passive access

## A1. Usage cases

- A 1.1 This annex sets out examples of possible investment opportunities that will be supported by the introduction of regulated unconstrained access to BT's ducts and poles and to its dark fibre, and which have the potential to offer significant benefits to consumers and businesses in terms of choice and service quality. Specifically it considers:
  - (a) FTTP network deployment;
  - (b) LLU/NGA backhaul; and
  - (c) mixed usage of duct and poles, and of dark fibre.

# **FTTP network deployment**

- A 1.2 FTTP network deployment by alternative infrastructure providers is an important business opportunity which will be supported significantly by unconstrained access to BT ducts and poles.
- A 1.3 FTTP network provides a network operator with a flexible infrastructure platform capable of delivering next generation broadband services to both residential and business customers. However, the economics of a FTTP network build are challenging. Sky has been conducting trials in this area<sup>6</sup>.
- A 1.4 Two key requirements for FTTP network deployment to be economically viable are:
  - (d) access to cost efficient methods of delivering fibre to each neighbourhood; and
  - (e) the flexibility to use the FTTP network (as far as is technically possibly) to satisfy the requirements of all end users.
- A1.5 Unconstrained access to ducts and poles would allow network operators to fulfil both of these requirements.
- A 1.6 First, passive access to existing duct and pole infrastructure provides a more cost efficient deployment method than new construction in some geographic areas, particularly where the street surface is not amenable to low-cost underground deployment techniques such as micro-trenching, and where planning constraints might limit the use of new aerial infrastructure. Within an exchange area, multiple FTTP deployment methods are combined to realise the most effective FTTP build plan (see Figure 1 below).
- A 1.7

Sky has announced a partnership with City Fibre

<sup>6</sup> 

Sky's trial build in South Harrow three years ago tested some established construction techniques;

and TalkTalk in York that is deploying FTTP.

## Figure 1 - FTTP deployment using passive access



- A 1.8 Second, FTTP networks provide the opportunity to provide multiple services such as residential and business grade broadband, leased lines<sup>8</sup>, backhaul and wholesale broadband services to other CPs.<sup>9</sup>
- A 1.9 However, the current BT PIA remedy restricts the scope of the product by excluding its use for leased lines and backhaul, preventing FTTP operators from deriving revenue from multiple uses.
- A 1.10 Requiring BT to provide passive access to infrastructure unconstrained by the end product offered will allow network operators to maximise the value of FTTP network deployment and unlock investment in viable alternative access networks. This would encourage network operators to deploy new FTTP infrastructure using a combination of both duct and pole access and new construction.

### LLU/NGA backhaul uses

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A 1.11 LLUOs primarily buy exchange backhaul through leased lines rented from a network operator (often BT). The product specifications and pricing of these lines are controlled by the network operator and, as stated in Sky's main response, competing leased line products are typically very similar to BT's products. Whereas passive access, in particular dark fibre, would likely increase the scope for LLUOs to access cost efficient backhaul that is sufficiently flexible to rapidly changing requirements of their customers.

<sup>&</sup>lt;sup>8</sup> There is no technical barrier to providing leased line equivalent services to businesses using FTTP infrastructure. Connectivity can be supplied by either provisioning sufficient point-to-point fibre in the passive layer to connect each business with Gigabit Ethernet (10 Gbit/s Ethernet) or Wavelength Division Multiplexing ("WDM")-based transport. Alternatively, even within a 100% Passive Optical Network ("PON") deployment, it is possible to configure dedicated bandwidth for some customers. With current generation Gigabit PON ("GPON") (2.488 Gbit/s downstream, 1.244 Gbit/s upstream), leased line equivalent services of < 1Gbit/s can be supported. Next Generation PON standards such as Time and Wavelength Division Multiplexed ("TWDM") PON overlay additional wavelengths on the PON. This enables symmetric 10Gbit/s or multiple 1 Gbit/s leased line services to be overlaid on the same PON network serving residential users. Therefore, the addition of business applications need not significantly increase the requirement for duct and pole space.

A 1.12 Exchange backhaul primarily requires access to dark fibre pairs in order to create high capacity circuits with sufficient flexibility to choose the most appropriate transmission technology for the network design. This is in contrast with a FTTP deployment which seeks to reduce connection costs by installing cables that carry multiple fibre pairs into unused ducts (or on poles) that pass premises in anticipation of future orders. These two scenarios are shown in Figure 2 below:



### Figure 2 – High-level FTTP topology

- A 1.13 An unconstrained dark fibre passive remedy would provide LLUOs with flexibility in choice of technology and transport topology without the inefficiency of deploying additional fibre cables. Indeed, the routes required for exchange backhaul are those where existing unlit cable is most likely to be available already.
- A 1.14 A dark fibre remedy that accommodates termination within a cable chamber, could be used as a component of LLU backhaul in combination with a third-party dark fibre provider<sup>10</sup>. This would maximise the flexibility of the dark fibre remedy and offer the LLUOs an opportunity to consume the lowest cost fibre available for each segment of a backhaul route.

### Mixed usage of duct and dark fibre

- A 1.15 Regulated access to ducts and poles and to dark fibre are complementary remedies which can provide a cost efficient opportunity to extend the reach of FTTP networks.
- A 1.16 Within an FTTP serving area duct and pole access will often be the preferred method by which to deploy the network. This is because the requirement for a significant number of fibres on cable routes means that existing unlit cable (i.e. dark fibre) capacity is unlikely to meet demand. For example, typical spine routes from the POP to a fibre distribution point, are laid with 288 fibre cables (although nearer to the POP routes can require 1000 fibres) which is likely to be far higher than the amount of available dark fibre on those routes.

<sup>&</sup>lt;sup>10</sup> The third party might be an existing dark fibre provider or an NGA operator consuming duct and poles access as part of an FTTP deployment.

- A 1.17 Moreover, in those parts of the access network where cables with a lower fibre count are required (such as the final fibre distribution to the customer premises where as little as 12 or 24 fibres may be deployed), there is typically little or no existing unlit fibre available.
- A 1.18 Therefore, where CPs are required to install new cables, duct and pole access will be preferred to dark fibre as it will provide more flexibility to control the cost of an FTTP deployment and achieve economies of scale.
- A 1.19 Whereas outside the FTTP serving area (see Figure 2 above), access to dark fibre alongside duct and pole access can facilitate cost efficient network deployment to premises including businesses, multiple dwelling units (MDUs), mobile mast sites and remote FTTP serving areas (such as business parks and residential areas that are too small to be served by a local POP.
- A 1.20 These areas can either be served by extending a cable from a FTTP serving area<sup>11</sup> or making use of any point-to-point dark fibre available and deploying active cabinets local to the serving area<sup>12</sup>.

<sup>&</sup>lt;sup>11</sup> The typical reach of a GPON using a 1:32 split is up to 20km.

<sup>&</sup>lt;sup>12</sup> The latter option increases the transmission choices available and avoids the cost of the increased complexity of deploying active equipment in the field.