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Business Connectivity Market Review: Passive Remedies

A report by DotEcon

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Executive Summary

A strategic decision about market development

The introduction of passive remedies amounts to a strategic choice about the regulation of the telecoms sector and its future development; it needs to be scrutinised accordingly.

The main categories of costs and benefits resulting from passive remedies have been identified through the 2013 Business Connectivity Market Review (BCMR), Colt's subsequent appeal of Ofcom's decision not to impose passive remedies, the Call for Inputs (CfI) for the latest BCMR and the current consultation on passive remedies. However, the trade-offs and uncertainties involved in any decision to introduce passive remedies have received far less attention.

What competition problem is being addressed?

Ultimately any need for passive remedies must derive from a demonstrated lack of effective competition within a properly defined relevant market. Any analysis of passive remedies should start not with the question of 'what could passives do?' but rather with that of 'what problem is being solved?'

In the current consultation, Ofcom acknowledges the need for remedies to be justified by SMP findings. Starting from SMP has immediate implications not recognised in the current consultation:

- Given a particular competition problem, there will be a variety of potential remedies, such as changes to the range of active access products or their system of regulation (currently through a tariff basket constraint and sub-caps). Passive remedies are likely to be more intrusive and riskier in terms of unforeseen impacts than active remedies and proportionality requires consideration of a sufficient set of alternative remedies.
- Ofcom's SMP findings to date for business connectivity services are based on an intersection of geographic and product market definitions. Were passive remedies introduced on the basis of SMP findings, they would almost certainly not be ubiquitously available, but rather limited to certain geographic areas and possibly also subject to restrictions on the services that could be supported over passive access products.

Nature of the passive remedy

At this early stage, no specific proposals have been made for any particular form of passive remedy. However, the nature of costs and benefits are potentially different under dark fibre and duct access remedies. Therefore, any detailed assessment of the net benefits of passive remedies would need to make more specific assumptions about the nature of the remedy, its geographic availability and any restrictions on the services carried over passive access.

Co-existence with actives

Existing active access products are already being used by CPs and would need to continue alongside any new passive access products for the foreseeable future. There would be multiple parallel remedies in place at the same time in the same value chain. Any winding back of active access products could only happen in the long run after some future market review.

As a matter of broad principle, parallel access remedies result in a compounding of risks. CPs will treat parallel access products as substitutes, choosing whichever is most cost-effective. However, the setting of access prices is always subject to potential error, with risks of under- and over-pricing. It only takes *one* of a number of substitutable access services to be under-priced to crowd out infrastructure investment. Therefore, multiple parallel access remedies exacerbate this risk.

Second-best, rather than simple competition on the merits

Passive access is not simply a matter of opening up a new part of the value chain to competition on the merits, where competing suppliers can swap out the incumbent's activities and assets for their own if and only if they are more efficient (whether by having lower costs or providing greater functionality). This view is grossly over-simplistic as it fails to consider that:

- A very considerable proportion of costs are common across different services (and indeed not just business connectivity). Passive remedies could fundamentally alter how Openreach can recover common costs. There is broad consensus that the current situation in which common costs are recovered to a greater extent from higher bandwidth active products (the so-called 'bandwidth gradient') may not be sustainable if passives are introduced. Any change in the current pricing structure would create winners and losers.

- Openreach's pricing currently demonstrates a high degree of geographical averaging. This means that entry based on passive access cannot be assumed to occur only where efficient. Passive remedies could lead to de-averaging of prices, again creating winners and losers. However, at the same time, access prices for passives could never fully reflect differences in cost by location, as this would be far too complex to be reflected in any realistic pricing scheme.

The costs and benefits of passive remedies need to be assessed taking into account limitations on the structure of access prices. In this second-best situation, there will be gains and losses. Not only may the former not outweigh the later, but also equity considerations across different customer groups need to be considered. Losers will tend to be users of lower bandwidth services and those furthest away from geographical areas with existing or emergent network competition.

Impact on the bandwidth gradient

Depending on the form of the pricing structure adopted, passive remedies would likely constrain the pricing flexibility afforded to BT by tariff basket charge controls. A passive product, if priced to attract demand, would constrain the extent to which common costs could be recovered from higher bandwidth active products, which presently carry a larger share of the burden of common cost recovery. Given that there are likely to be significant benefits associated with this pricing flexibility, introducing passive remedies could have detrimental impacts.

In the case of access to dark fibre, these risks can be somewhat mitigated by pricing a passive product by reference to a sufficiently high bandwidth active product, stripping out electronics costs. However, risks remain due to the uncertainties in measuring cost and setting access prices. Other approaches, such as pricing passives by reference to the cheapest of a number of active services could constrain the pricing structure of active services to a great degree.

Access to duct would seem most likely to be priced though a bottom-up costing approach, but this creates substantial risks of uncoordinated pricing of active and passive products, again constraining active pricing.

Is reducing the bandwidth gradient a cost or a benefit?

Some CPs have suggested that flattening the bandwidth gradient should be seen as a benefit, rather than a cost, of introducing passives. However, this argument is illogical.

Implicit to such a view is that there is a failure of the current system of regulation for active products through a tariff basket cap with various sub-caps. However, the use of a tariff basket constraint to provide limited flexibility to Openreach over the structure of relative prices for different services is considered and deliberate decision by Ofcom; moreover, it has been reconfirmed over a number of market reviews. This approach provides flexibility for Openreach to recover common costs reflecting demand conditions and to facilitate the migration of customers to new generations of products from legacy products. To the extent that there are concerns that flexibility could lead to anti-competitive prices, Ofcom has used various sub-caps to set limits to this flexibility.

No specific evidence has been submitted in the CfI to suggest that Ofcom has been incorrect in its approach to date of providing limited pricing flexibility to Openreach. However, even if that approach were now considered deficient in some way, this is not an argument *per se* for passive remedies; rather it would be a criticism of the current structure of regulation for active access products that in the first instance would suggest consideration of changes to that structure.

Impacts on Openreach's costs and operating efficiency

Passives would have a number of practical effects on Openreach's operations that could affect unit cost and service quality:

- Openreach's ability to manage capacity within its network (for example by choosing the route of fibres) may be hindered. Together with increased uncertainty about demand from CPs (including whether this demand might be for active or passive products), there is likely to be a greater need to hold spare capacity and to build ahead of demand. This would tend to reduce average rates of asset utilisation and increase unit costs, eventually impacting on prices paid by customers;
- The removal of monitoring equipment currently present on active services may lead to practical difficulties with fault reporting and identification with Openreach's network. In turn, lack of clear information about faults may create difficulties in contracting over and enforcing SLAs;
- There are likely to be implementation costs associated with changing Openreach's business processes regardless of whether demand for passives is actually realised.

Competitive impacts

Passives remedies cannot be assumed to lead straightforwardly to an increase in competitive intensity. Due to limitations on the

complexity of any practical pricing structure, there will always be arbitrage opportunities. These are likely to lead to commercial benefits for specific CPs from introducing passives, but these are not necessarily the same as competitive benefits, where the intensity or scope of competition is enhanced.

Any assessment of the net benefit of passives also needs to consider whether these benefits might be achievable in less intrusive and less risky ways, for example through changes to the range of active access products or how they are regulated. Such consideration would be an essential step to demonstrating the proportionality of introducing passive remedies in response to a specific, identified competition problem.

Infrastructure investment

BT and other CPs have invested in their own infrastructure under the existing regulatory regime and continue to do so. To promote infrastructure competition in the long term, any assessment must consider the impact of passive remedies on investment incentives, both of BT and other CPs. There are good reasons to expect passive remedies to depress infrastructure investment incentives:

- By creating parallel interventions in the same value chain, with different access products being potential substitutes, the risks of depressing infrastructure investment incentives through at least one of those assess products being under-priced is exacerbated. Pricing of active and passive products cannot be expected to be sufficiently well co-ordinated to avoid this risk.
- Because of practical limitations in setting sufficiently geographically differentiated prices, entry based on passive products may not always be efficient. There is a particular danger that passives are particularly attractive in geographic areas with emergent infrastructure-based competition and depress such investment.

Genuine infrastructure investment provides clear benefits over and above competition based on passive access. For example, within WECLA the presence of a number of networks with separate physical infrastructure and quite different topologies provides possibilities for enhanced resilience (through multi-sourced connectivity) and service differentiation for niche customers (e.g. low latency services for the finance industry).

Innovation benefits

Claims have been made in the CfI that passive remedies could lead to greater innovation. However, these fail to distinguish genuine

technical novelty from commercial choices that CPs might make about the functionality of the services they offer.

Most novelty in services does not require access to the physical network layer (OSI Layer 1) and so could be achieved through active access products. If the provision of some new service requires access to the network layer, then this necessarily involves the technical standards and functionality of network equipment. However, there is a global market for such equipment and manufacturing is subject to strong scale economies. Therefore, it is implausible that the approach taken to passive remedies in the UK could have any significant impact on the incentives to innovate in terms of expanding the functionality of network equipment.

If any niche applications requiring access to dark fibre were to emerge, these would be most likely demand in geographies with high network reach (e.g. financial institutions in Central London) where there would be competitive supply.

Furthermore, if a specialist application were to emerge that required corresponding an access product designed to the application's particular characteristics, then this should be reflected in the market definitions established by periodic market review. If a specific service or application can only use a particular type of access product, and other access products are not substitutes, then this would suggest defining a separate market for access products to support that application.

Uncertainty and timeframes

There is considerable uncertainty about both the costs and benefits of passive remedies. However, these uncertainties are rather different in nature.

We can be reasonably sure that there are significant costs associated with the introduction of passive remedies. Flattening the bandwidth gradient is likely to lead to a significant on-going cost (otherwise existing approaches to regulation of active products that provide Openreach with limited pricing flexibility are difficult to rationalise). However, the magnitude of this cost is uncertain and depends on specific assumptions about the nature of demand (especially price elasticity) for different products. Impacts on Openreach's operating efficiency and unit costs are also difficult to gauge, but could have a significant associated on-going loss of consumer surplus. There would also certainly be a one-off cost of changing Openreach's business processes to accommodate passives.

Benefits result primarily from innovation and possible service differentiation. However, these benefits are much more speculative than the costs and likely to be incurred over a longer timeframe.

Indeed, Ofcom has itself acknowledged that weighing the costs and benefits involved looking beyond a single market review cycle.

Proportionality and precaution

If passives were introduced, they would be difficult to unwind. Therefore, we face a larger irreversible decision with uncertain costs and benefits occurring over different timeframes. This strongly suggests that a precautionary approach should be adopted in that:

- Expected benefits would need to exceed expected costs to a sufficient extent for introduction of passives to be justified. This reflects the lost option value associated with crystallising a decision to introduce passives, in that the possibility of waiting and making a decision at a later time with better information is then foregone;
- Measures to de-risk any decision need to be considered, in terms of phasing change and consider staging posts along the way, rather than directly facing the unmitigated risk of a possibly dislocating change that is difficult to reverse. In this regard, if the prompt for consideration of passive remedies is a specific competition problem, then it is important to consider whether there are other, less risky, approaches (for example, changes to active remedies).

The principle of precaution and need for proportionality of any remedies both suggest similar approaches. Any case for passive remedies should address a specific identified competition problem and demonstrate that it is the best response to that problem from the available range of remedies. Therefore, the relevant counterfactual for considering introducing passive remedies is a well-designed system of regulation for an appropriate range of active access products. Because of this, many of the arguments advanced in favour of passives are not compelling, as they could be addressed through less intrusive modifications of the current regulatory structure for active services.

What Ofcom would need to do

Despite stating that it will balance the different considerations when assessing the appropriateness of imposing passive remedies, Ofcom remains vague on exactly what the key trade-offs are and how it might weight costs and benefits in practice.

There is a significant burden of proof on Ofcom to validate the introduction of passive remedies, in that a sufficiently certain net benefit is required to justify their adoption. It is important that Ofcom quantify the costs and benefits where possible and, in any case, provide as much transparency in argumentation as possible to

show that, were it to decide to introduce passive remedies, doing so would be net-welfare enhancing.

To justify the introduction of passive remedies Ofcom must provide clear evidence to demonstrate why this more intrusive regulation is the most appropriate remedy to deal with any issues identified in its market power assessment. This means showing that this is a proportionate remedy in that not just the costs of such a change are outweighed by any benefits, but also that the overall net benefit is greater than could be achieved from any other feasible form of intervention.

Therefore, Ofcom would need to conduct an analysis in which:

- significant market power in a relevant market (defined by geography and product characteristics) is identified;
- a sufficient range of potential remedies to address SMP is identified (including not least the possibility of using active access remedies even if not in their current form);
- assumptions about the scope and other characteristics of each remedy are clearly set out (in that duct and dark fibre remedies have quite different implications) including realistic assumptions about how regulated prices might be set;
- costs and benefits associated with these options are quantified (taking into account of limitations on the complexity of prices that lead to geographical averaging and also uncertainty in the determination of regulated access prices);
- these costs and benefits are compared taking account of the timescales over which these are incurred, their associated uncertainties and the extent to which adopting particular approaches may be difficult to reverse.

In particular, the introduction of passive remedies must be assessed against changes to the existing regulatory regime on actives (where there are genuine competition concerns identified that are not already dealt with under the existing regime).

1 Introduction

There has been significant debate about passive access in the course of the 2013 Business Connectivity Market Review ("BCMR") statement[1] and Colt's subsequent appeal of Ofcom's decision not to impose passive remedies.[2] However, the issue remains a key aspect of Ofcom's preliminary consultations ahead of the latest BCMR.[3] In this report we outline the key principles that Ofcom ought to consider in its assessment and emphasise the significant burden of proof required given the uncertainties involved and the irreversible nature of any decision to introduce passives.

1.1 Background

Ofcom considered the main issues in the 2013 BCMR

Passives were considered in the previous BCMR consultation as a potential remedy to SMP findings in specific business connectivity markets, but Ofcom decided not to proceed further with consideration of this option.

While noting that the imposition of passive access remedies could be another way of supporting competition in downstream markets, Ofcom decided not to mandate passive access. Despite identifying potential benefits associated with passive remedies, including lowering barriers to entry and providing more scope for product innovation, Ofcom found limited evidence that CPs would make investments if passive access were mandated. Ofcom raised concerns that passive remedies could lead to worse outcomes for consumers and competition in some cases.

Ofcom's decision recognised the broad impact of passive remedies on BT's pricing of active products, noting that passive remedies would be inconsistent with the current form of charge controls on active wholesale services.[4] For example, if a single flat rate charge

[1] "Business Connectivity Market Review. Review of retail leased lines, wholesale symmetric broadband origination and wholesale trunk segments - Statement", Ofcom, 28 March 2013.

[2] The Competition Appeal Tribunal Case No.: 1212/3/3/13. Judgment published 26 November 2013.

[3] "Business Connectivity Market Review. Preliminary consultation on passive remedies – Consultation", Ofcom, 5 November 2014. (Referred to hereafter as "the preliminary passives consultation").

[4] See paragraph 1.41 of 2013 BCMR Statement.

for passive access were set, Ofcom considered that BT could lose sales of its high-margin wholesale leased lines services and would fail to recover its common costs. This could lead to re-balancing of the prices of wholesale services and limit BT's flexibility to recover its common costs, losing an important benefit of the current charge control design.[5]

Ofcom also had concerns about the potential for inefficient entry arising from uniform pricing structures for passives.[6] Significant regulatory changes would be required, so there would need to be clear evidence of benefits over and above those that could be achieved under the current approach based on access remedies.[7]

On balance, Ofcom considered that passive remedies would be unlikely to lead to better market outcomes than the package of active remedies proposed as part of the market review process. For these reasons, Ofcom chose not to mandate passive remedies, either alongside, or instead of, existing remedies.

Colt appealed the 2013 statement, but the CAT found in favour of Ofcom

Colt unsuccessfully appealed Ofcom's decision not to impose passive access. The Competition Appeal Tribunal ("CAT") found in favour of Ofcom's approach based on the uncertain nature of the benefits and significant risks of adverse effects.

The CAT found that Ofcom was clear that any passive remedy would need to co-exist with existing active services for some considerable time, with costs and benefits being assessed incrementally on top of existing remedies to determine whether passive remedies would lead to a better overall outcome.[8] This need to show that passive remedies would lead to better overall outcomes was determined to be the most important part of Ofcom's reasoning underpinning its

[5] See paragraph 8.84 of 2013 BCMR Statement: "This would have the effect of removing BT's flexibility in setting charges for its wholesale services…we consider that flexibility to vary relative charges within the charge control basket is an important benefit of our charge control design. These potential undesirable consequences further support our view that passive remedies would be likely to be part of an alternative to the package of remedies we are imposing rather than a complement."

[6] See paragraph 8.83 of 2013 BCMR Statement; "the charges could give excessive incentives to use passive access because CPs could find that the sum of the charge for passive access and the costs of their equipment were lower than the charge for BT's equivalent wholesale service even where using passive access increases total costs, which would be inefficient."

[7] *"…imposition of passive remedies is likely to require significant regulatory changes and intervention, and we would therefore need clear evidence to persuade us that this would be justified, it is not clear at present that imposing passive remedies would lead to better market outcomes in the round than the package of remedies we have decided to impose*." See paragraph 1.45 of the 2013 BCMR Statement.

[8] See paragraph 84-85 of the Judgment.

decision.[9] The judgment also acknowledged that Ofcom had been clear in setting out why imposing passive access would not meet its objectives.[10]

There was a general consensus amongst the parties that there were trade-offs involved between costs and benefits of passive remedies, and that Ofcom had considered both the possible benefits and the possible disadvantages, attaching most weight to the likely impacts on entry and on the way in which BT could recover its common costs.[11]

Based on the evidence submitted to Ofcom, the CAT considered that Ofcom was justified in determining that investment in infrastructure based on passive remedies would not be substantial.[12] The judgment also recognised the potentially wide impact of passive remedies on BT's pricing of active products arising from geographically average pricing structures allowing inefficient entry, "…*which could threaten to disrupt the system of BT's common cost recovery, and cause it to increase prices for some products and locations, to the overall detriment of competition.*"[13]

The CAT acknowledged that Ofcom had identified a preference for dealing with risk of abuse of pricing flexibility through further refinements to the active price controls on the basis that this would, in Ofcom's view, lead to a more efficient outcome.[14] The CAT supported Ofcom's approach of assessing whether the same benefits could be achieved with active remedies whilst minimising the risks associated with passive remedies, thus leading to a more efficient outcome[15] and concluded that Ofcom had asked itself the

[9] See paragraph 99 of the Judgment.

[10] The CAT considered that, "OFCOM was open about its objectives, making it clear in the Statement that it was trying to promote competition in the long term at the wholesale level based on investment in economically efficient alternative infrastructure, combined with regulated access to BT's wholesale services, and concluded that passive remedies, taken in the round, would not help it do so." paragraph 173 of the Judgment.

[11] See paragraph 171 and 177-178 of the Judgment.

[12] Although not fundamental to the validity of Ofcom's decision, limited evidence of intention to invest reinforced its decision that passives would not lead to better overall outcomes. See paragraph 95-99 of the Judgment.

[13] See paragraph 178 of the Judgment.

[14] See paragraph 32 of the Judgment.

[15] Paragraph 169 of the Judgment outlines one of the key questions the CAT sought to address: "…whether Ofcom has erred in its assessment of the relative merits of active and passive remedies and, in particular, whether the same benefits could be achieved with active remedies".

right questions and properly assessed all the relevant material.[16] As such the CAT unanimously dismissed Colt's appeal.

The current preliminary consultation on passives

Ofcom's 2014 preliminary consultation covers much of the same ground as debated in the previous BCMR and in the Colt appeal. The consultation does not introduce any fundamentally new points with regard to the main sources of costs and benefits, whilst it fleshes out both:

(i) costs due to inefficient entry – considering in greater detail under what circumstances BT would be forced to rebalance its pricing of active services and what arbitrage opportunities would be available for CPs; and

(ii) benefits from innovation – considering the impact of greater freedom from BT and whether new services that could be brought to market sooner, including a specific example of C-RAN for mobile networks.

Ofcom has also clarified that any passive remedies would likely be geographically limited, as they would ultimately derive from SMP findings in specific relevant markets.[17] However, this raises new questions about how the scope of any passive access obligation would interact with the product/geographic analysis of SMP undertaken by Ofcom.

Ofcom emphasises that there would be a considerable lead time in implementing any passive remedy and that moves towards passive remedies might not come to fruition until after a subsequent market review (beyond March 2019).[18] Furthermore, Ofcom has acknowledged that the effects of passives may extend beyond the leased lines market. Therefore, the decision to impose passive remedies presents a fork in the road with regard to market developments with implications extending beyond the timeframe and scope of a single market review.

1.2 Structure of this paper

Section 2 sets out certain key features of the decision to introduce passives and that it is not a simple case of exposing some aspect of a value chain to competition on the merits. In Section 3 we discuss

[16] See paragraph 179 – 182 of the Judgment.

[17] The consultation states that any use of passive remedies would be need to be justified by SMP in specific relevant markets, rather than as a general obligation applying uniformly in all geographical areas.

[18] Because of this, Ofcom consider a sufficiently long-term view needs to be taken. See paragraph 2.9 of the preliminary passives consultation.

the sources of costs and benefits. In Section 4 we discuss how to approach the comparison of costs and benefits and emphasise the burden of proof faced by Ofcom to justify the introduction of passives.

2 A strategic decision about market development

The debate to date has already demonstrated the likely wide-ranging impact and the enduring nature of any decision to introduce passives. Given the need for significant restructuring of regulation and possible long-term impacts, the introduction of passive remedies represents a strategic choice about the regulation of the telecoms sector and its future development and needs to be scrutinised accordingly.

Despite clearly identifying the majority of the issues in its preliminary consultation document, it remains clear that there is a balance to be struck between costs and benefits and Ofcom has not yet provided a clear framework to demonstrate how it will go about balancing these effects. Furthermore, Ofcom has not acknowledged some of the key risks associated with imposing new remedies or the 'second-best' nature of the trade-off.

2.1 Grounding from significant market power

What competition problem is being addressed?

Any need for passive remedies must derive from a demonstrated lack of effective competition within a properly defined relevant market. Any analysis of passive remedies should start not with the question of 'what could passives do?' but rather with that of 'what problem is being solved?'

Remedies follow from SMP…

In the absence of a detailed market review, it is not clear what the nature of the problem is that Ofcom would be seeking to address with the introduction of passives given that falling BT market shares in this market[19] suggest that that the current regulatory approach is effective in promoting competition.

…and need to be proportionate

In the current consultation, Ofcom does acknowledge the need for remedies to be justified by SMP findings.[20] However, passive access remedies present just one of a variety of potential remedies that also include changes to the range of active access products or their system of regulation. Proportionality requires consideration of all

[19] BT's response to this consultation presents estimates of market shares based on latest available data (see Table 1 of Section 2), which suggests that competition has strengthened significant since the last BCMR.

[20] For example, see paragraph 6.16 of the preliminary passives consultation.

alternative remedies and must take account of the intrusive nature and the risk of unforeseen impacts associated with different remedies.

2.2 Parallel intervention and risk

Co-existence of passives and actives creates risk for infrastructure investment incentives

Supposing Ofcom were to consider introducing passive access, it is likely that for the foreseeable future these would have to co-exist alongside the existing active access products already being used by CPs. However, there are risks associated with having multiple parallel access remedies in place at the same time in the same value chain.

CPs will treat parallel access products as substitutes, choosing to take up whichever is most cost-effective. However, regulated access prices are set subject to uncertainty, giving rise to risks that access may be over or under-priced. Having multiple access remedies exacerbates this risk as it only takes *one* of a number of parallel access services to be under-priced to crowd out efficient infrastructure investment.

Optimal regulation should balance the risks of setting access prices too high or too low, considering the magnitudes of the adverse consequences in each case. However, that the welfare impact of under- and over-pricing are not symmetric and more weight needs to be given to under-pricing risks:

- If access prices are set too high, this results primarily in a short-run loss of potential consumer surplus, but emergent infrastructure competition is not discouraged;
- If access prices are set too low, this damages emergent competition and possibly also disincentivises new services altogether, which is likely to result in much greater welfare losses in the longer run.

Box 1 provides a simple example of how the risks associated with setting regulated access prices may be may be compounded by parallel access remedies in the same value chain.

Box 1: Parallel access remedies result in a compounding of risks

Suppose that when setting prices Ofcom balances the risks of setting prices too high and too low and errs on the side of caution. It adopts some methodology for setting the access price of a wholesale product that results in the probability of the price being too low (given Ofcom's objectives) being modest, say 10%.

Now suppose that an additional layer of access regulation is introduced at some other point in the value chain, offering a substitute wholesale product that CPs could use instead of the original access service (and instead of investing in their own network infrastructure).

Suppose that the price of the new wholesale service is regulated in a similar manner and there is (independently) a 10% chance the price might be too low.

CPs will simply choose amongst the options of the two different wholesale products and self-provision, picking whichever represents the most attractive option. Therefore, what matters for infrastructure investment incentives is the most attractively priced of the two wholesale services. There is now a 19% chance that *at least one* service is priced too low, as the risks of under-pricing cumulate.[21]

If we are to avoid access being too attractive (and the potentially negative consequences associated with encouraging inefficient investment choices and discouraging self-provision), we need to ensure that *neither* wholesale product is priced too low.

If there were more layers of access regulation within the value chain, then the under-pricing risk would grow accordingly. To counteract this growing risk, it is necessary for greater weight to be given to under-pricing risk when determine each individual access price.

[21] If there is a 10% chance that one access service is priced too low, there is a 90% chance that it is not priced too low. Assuming independence, there is an 81% (= 90% x 90%) chance that neither service is priced too low. Turning this around, this means that there is a 19% (= 1 – 90% x 90%) chance that at least one service is priced too low. If there were three parallel access services, then the chance that at least one service is price too low would increase to 27.1% (= 1 – 90% x 90% x 90%). The assumption of independence is made for simplicity, but is reasonable given the costs of each access service will depend on different factors. This is not a critical assumption, as whenever the risks of underpricing access services are not perfectly correlated, these risks will cumulate.

2.3 Opening the value chain to competition

Second-best rather than simple competition on the merits

Passive access is not the same as a 'textbook' case of opening up a new aspect of the value chain to competition on the merits, where making a wholesale product available at its upstream production cost is beneficial as it opens downstream activities to potentially more efficient operators and where entry would occur *if and only if* it were efficient (i.e. the entrant had lower costs in its downstream operations than the vertical integrated provider).

Passive access differs from this simple in important ways:

- geographical averaging of access prices may create opportunities for inefficient entry;
- physical assets used upstream (i.e. ducts and fibre) are common to many different services lying in different economic markets and there are questions about efficient recovery of these common costs;
- there are very significant uncertainties in the measurement of cost and the setting of access prices.

As a result, even with the most optimistic assumptions about a regulator's ability to set access prices, we cannot assume that entry would always be efficient. Moreover, as a result, the balance of common cost recovery across different services may be affected with implications for both efficiency and equity.

2.4 Irreversibility and precaution

If passive products are taken up, they involve services that cannot be easily withdrawn at some later point in time. CPs may make complementary investments linked to passive products and might not be able to shift back readily to active access services. A decision to introduce passive remedies is, therefore, largely irreversible (or at least so costly to reverse as to be impractical) once passive products are taken up to any significant degree. At the same time, both costs and benefits are uncertain.

As this is an irreversible decision made under uncertainty, it is appropriate to apply the precautionary principle, where steps are made to control potential damage. There has been significant debate about the implications of irreversible decisions in the

context of public policy towards technological developments (e.g. introducing genetically modified crops). [22]

Applying the precautionary principle does not mean that the status quo must necessary dominate. However, it is important to recognise that there is an option value foregone by making an irreversible decision, as the possibility of finding out more over time about costs and benefits, and so making a more informed decision, is lost. For this reason, expected costs should exceed expected benefits to a sufficient degree to compensate for the lost option value.[23] Put simply, where there is an irreversible decision with uncertain costs and benefits, then benefits should exceed costs by a sufficient margin that reflects this uncertainty.

Furthermore, in such a situation, there may be active steps that can be taken to reduce the risk of harm arising that cannot be easily undone. For example, it may be possible to find out more about costs and benefits, or to make a change in more gradual steps.[24] In the context of introducing passive remedies, this is closely linked to the question of proportionality (as we shall discuss in Section 4). It is always necessary to ask whether there are alternative remedies that offer a better balance of cost and benefit, taking into account uncertainty and irreversibility.

[22] See for example UNESCO, "The Precautionary Principle", 2005 available at http://unesdoc.unesco.org/images/0013/001395/139578e.pdf

[23] See for example, Dixit and Pindyck (1994) "Investment under uncertainty", Princeton University Press.

[24] For example, the general approach of taking active steps to reduce the impact of irreversibility when the precautionary principle is applied is discussed in Stirling et al (2001) "On Science and Precaution in the Management of Technological Risk", European Commission Joint Research Centre, available at http://ftp.jrc.es/EURdoc/eur19056IIen.pdf

3 Categorising the effects

Following the Colt appeal and the CfI, a good degree of consensus has emerged about the relevant effects of passive remedies. We can group these into five areas:

- **Changes in pricing and the bandwidth gradient** - Depending on the form and the pricing structure adopted, passive remedies could constrain the pricing flexibility afforded to BT by tariff basket charge controls. To the extent that there are benefits associated with this pricing flexibility, introducing passive remedies that constrain it could have detrimental impacts. However, the CfI attracted a number of responses questioning the appropriateness of this pricing flexibility and suggesting that it might provide BT with opportunity to set anti-competitive prices. According to this contrary view, tariff rebalancing forced by the introduction of passive remedies would not necessarily result in efficiency losses.
  There is scant evidence to suggest that the existing regulatory regime, which has been maintained through a number of regulatory reviews, has failed to control such possibilities. Furthermore, the introduction of passive remedies cannot be justified on the sole basis that it would remove the scope for BT to use its pricing flexibility to price anti-competitively. Even if such problems were to arise, passive remedies are not only available option to correct them, as there is always the possibility of redesigning the existing regulatory regime for active services, raising questions about the proportionality of passive remedies.
- **Operational and cost impacts** – the introduction of passive remedies could lead to significant changes to the way in which Openreach and BT Wholesale operate. In particular, there may be changes to how Openreach invests in physical assets to manage the greater demand risks that would arise with passive remedies; in turn, this could reduce asset utilisation. Where this leads to changes in efficiency or BTs costs, there may be implications for the prices faced by end users (and potentially more broadly that just in business connectivity markets).
- **Competition and entry –** For competition benefits to materialise, access prices must be set to encourage efficient entry and discourage inefficient entry. However, natural limitations on the pricing structure of passive remedies create a significant risk that inefficient entry will occur; such competition will not be 'on the merits', but simply driven by arbitrage opportunities. Therefore, although the introduction of passive remedies may be beneficial for some

entrants, this does not necessarily mean that it is pro-competitive overall.

- **Investment incentives –** BT and other CPs have invested in their own infrastructure under the existing regulatory regime. To promote infrastructure competition in the long term, any assessment must consider the impact of passive remedies on investment incentives, both of BT and other CPs. The potential for inefficient entry and difficulties in setting efficient access prices for passive remedies alongside active remedies may erode investment incentives. To the extent that returns from existing assets are eroded, future irreversible investments may be perceived to be more risky.
- **Innovation** – Dynamic efficiency benefits could be realised where the introduction of passive remedies would lead to the introduction of new products/services that would not be available under the existing regulatory regime. However, there is great uncertainty about the extent to which the possibility of, and incentive for, such innovations rests on passive remedies. Innovations themselves may depend on developments in network equipment for which there is a global market. Access to the physical layer of the network may not be necessary to make main innovations claimed. Even if access to the physical layer were to prove necessary, it is plausible that customers for such services may already be in competitively supplied areas, limiting the role of passive remedies in facilitating such developments.

In this Section we discuss each of these five key issues in turn.

3.1 Pricing and the bandwidth gradient

In this sub-section we consider the reasoning behind Ofcom's regulatory decision to allow pricing flexibility and consider the reasons why BT would be very likely to face constraints on this pricing flexibility, forcing re-balancing of its pricing of active services if passive remedies were introduced. To the extent that the existing regulatory regime controlling the pricing of active access services is superior to alternatives, then a shift away from such a pricing regime or significant constraints on BT's ability to price in this way could be detrimental and have welfare reducing consequences. There is a close logical connection between the design of the regulatory system for *active* services and the welfare impact of price changes associated with *passive* remedies.

3.1.1 The existing tariff basket charge controls

Active services are subject to a tariff basket constraint

BT's existing regulated active business connectivity services are subject to tariff basket regulation where the services within pre-defined baskets must collectively comply with the price control. This constrains the weighted average charge increase for the services in the basket, providing limited pricing flexibility for Openreach.

Ofcom has a long established position on its approach to basket charge controls and chooses to combine services into broad baskets unless there are good reasons not to do so.[25]

There are advantages associated with a basket control

In the last BCMR, Ofcom has acknowledged the main advantages of adopting a broad basket for a charge control[26] and noted that allowing BT some pricing flexibility within the charge controls was likely to give rise to a better outcome than one in which charges are set individually for each service based on costs.[27] Allowing BT some more freedom would, in Ofcom's view, be more likely to result in charges which allow BT to recover its costs, particularly fixed and common costs, in an efficient way – a particularly important factor for services like leased lines where there are high common costs and low marginal costs.[28] Ramsey pricing principles suggest that

[25] Ofcom notes that this has been its position in previous charge controls including the LLCC 2009, NCCs, WBA CC and the ISDN 30 charge control. At the time of the 2013 BCMR Ofcom set out its initial proposals in the Leased Lines Charge Control Consultation 2012 and sought to address issues raised by respondents to that consultation. See Ofcom, July 2012, Leased Lines Charge Control Consultation, available at: http://stakeholders.ofcom.org.uk/binaries/consultations/llcc-2012/summary/LLCC_2012.pdf

[26] See paragraphs 18.10-18.13 of the 2013 BCMR

[27] Because "…costs do not normally increase in direct proportion to the bandwidth of the circuit. Simply setting all charges equal to a measure of accounting costs, such as FAC, may result in a lower level of output than with a more flexible pricing structure. In the example of bandwidth, the use of a FAC based approach could mean spreading the fixed and common costs evenly across all products. This could push up charges for lower bandwidth products and reduce them for higher bandwidths. This may not be the most efficient way to recover common costs." See paragraph 18.11 of the 2013 BCMR Statement.

[28] Specifically, Ofcom noted how allowing for this flexibility was likely to give rise to a better outcome than one in which charges are set individually for each service based on costs (as proposed by some of the CPs in their responses to the recent CfI). See paragraph 18.11 of the 2013 BCMR Statement.

there will be an efficiency benefit if common costs are recovered to a greater degree from services that are less price elastic.[29]

Although this is a static benefit (in the sense that BT is afforded flexibility to use its knowledge of cost and demand conditions to recover common costs efficiently), there is also a broader dynamic benefit. BT can respond to changes in demand and costs by changing relative prices within the basket over time – particularly important in a rapidly changing market.[30]

Furthermore, by including both old and new services in a single charge control basket, BT is given flexibility to structure prices to encourage efficient migration when a new generation of technology is introduced. For example, the tariff basket constraint allows the setting of lower prices (to a degree) for new services and compensated for by higher prices (to a degree) for legacy services. This might encourage consumer switching and help to build scale economies and enjoying learning-by-doing benefits for new services.

Both rationales for providing flexibility - common cost recovery and efficient migration from legacy services - involve limited delegation of some decisions about structuring prices to BT in order to benefit from information available to BT about demand and cost conditions.[31] If these decisions were taken by the regulator, rather than delegated, all relevant information could not be taken into account and there would be far less flexibility to take changing circumstances into account.

[29] Notice that it is not necessary for BT to set prices that are precisely equal to (socially optimal) Ramsey prices for this benefit to be present; it is sufficient that the prices set under the basket price cap are more efficient than had a regulatory decision – which will lack information about demand conditions – been made about how to allocate those common costs. By delegating decisions on common cost recovery, Openreach does not need to have carefully estimated elasticities for services, but can rather use the flexibility afforded by a tariff basket constraint to adjust toward roughly efficient common cost recovery by making changes to the relative prices of different services over time.

[30] *"Furthermore [Ofcom] believe that BT is better placed to assess demand patterns in detail and set relative prices for each product".* See paragraph 18.12 of the 2013 BCMR.

[31] We note that during the Colt hearing, there was agreement that such pricing flexibility could be advantageous. Dr. Lilico, for Colt, agreed that price discrimination can be socially optimal, and in many markets is so. For example, see Colt hearing transcripts, Day 2, page 21 (Dr. Lilico).

There may be some disadvantages associated with a basket control…

However, Ofcom is also aware that without additional controls such as sub-caps and sub-baskets there is a *"risk of adverse effects arising from price distortion, particularly excessive pricing or unduly discriminatory pricing"*.[32] Ofcom has noted disadvantages associated with adopting broad baskets:

- It could be used to favour BT's downstream operations, where BT and other operators are using different wholesale services included within the same basket, through setting lower prices for those used by BT downstream than for those used by the other competing operators;[33]
- Where a basket would include products that face different competitive conditions, BT could lower prices of the most competitive services while at the same time increasing the prices of the products with less competition.[34]

…but such risks can be protected for within the regulatory regime

However, as recognised by Ofcom, these potential disadvantages can be mitigated through the appropriate design of the baskets. Narrower baskets, or the addition of sub-baskets, could be introduced to control risks of anti-competitive prices whilst retaining some of the advantages associated with providing BT flexibility and delegating some decisions about pricing structure. For example, BT's incentives to favour its downstream operations could be removed by narrowing the basket to include only services being used relatively more by BT and introducing a separate basket to include only services used relatively more by competitors, or including in the same basket only services with broadly the same degree of competition.[35]

Introducing sub-caps within broadly defined baskets could also prevent BT from setting charges to harm competition whilst retaining the benefits of pricing flexibility. Ofcom considered that including such controls whilst maintaining broadly defined baskets would be preferable especially where there are significant common

[32] See paragraph 18.8 of the 2013 BCMR.

[33] *"Where BT and competing operators use different wholesale services to provide the same downstream service, BT may have an incentive to reduce the price of the wholesale service it uses most and increase the price of the wholesale service used by its rivals. Placing both wholesale services in a single charge control basket without further restrictions could give it the ability to behave in this way, and this could harm competition"* See paragraph 18.16 of the 2013 BCMR.

[34] *"If competitive conditions differ between services within a single basket, BT may have an incentive to concentrate price cuts on the most competitive services and offset these with increases where competition is weaker. This might lead to excessive charges for the less competitive services and might also encourage anti-competitive pricing of the more competitive services."* See paragraph 18.17 of the 2013 BCMR.

[35] See paragraph 18.18 of the 2013 BCMR.

costs between services and where BT has strong incentives to set charges efficiently.[36]

In the build-up to the 2013 BCMR Statement, Ofcom consulted on these general principles in the LLCC Consultation. Ofcom received no responses in relation to the general approach to be followed to identify the relevant services and appropriate charge control baskets and sub-caps and Ofcom clearly re-stated these principles in Section 18 of the 2013 BCMR Statement. Given that Ofcom's position is consistent across previous charge controls including the LLCC 2009, NCCs, WBA CC and the ISDN 30 charge control,[37] it is clear that these principles are well-established and it is a deliberate and considered regulatory decision to afford BT some pricing flexibility.[38]

Applying these principles to price controls for the Business Connectivity Market

Applying these principles to the regulatory controls for wholesale business connectivity services for which BT was found to have SMP in the 2013 BCMR, Ofcom decided to define two separate service baskets:

- TI – covering low, medium and high bandwidth services outside the WECLA, low bandwidth services within the WECLA and regional trunk services at all bandwidths.
- Ethernet – covering services up to and including 1Gbit/s outside the WECLA and Ethernet services above 1Gbit/s outside the WECLA.

In addition, Ofcom is separately controlling excess construction charges (ECCs), accommodation services and AISBO services in the WECLA, covering AISBO services up to and including 1Gbit/s inside the WECLA. Ofcom also defined a number of sub baskets and imposed sub caps on certain services within these baskets to

[36] See paragraph 18.20 of the 2013 BCMR.

[37] For example, in the LLCC 2009, Ofcom stated that *"[when] deciding on the appropriate charge control baskets [Ofcom has] balanced two potentially conflicting requirements: the requirement to give BT enough pricing flexibility to respond to changing market conditions and to manage migration from old to new services; and the need to ensure that this pricing freedom is not used in a way that might harm competition. [Ofcom believes the] baskets strike an appropriate balance between these two objectives."*

[38] The Competition Commission ("CC") has also supported this approach in the past. For example in the context of the LLCC 2009, the CC supported Ofcom's approach stating that "in an industry with large common costs, the 'correct' cost of each product is very difficult to know" and that providing BT with the flexibility to price on a cost-reflective basis, subject to the sub-caps is "a sensible division of powers… and reflected a considered judgement by Ofcom consonant with the purposes of the 2003 Act" . See paragraph 3.253 and 3.268 of the CC's determination on the Cable & Wireless UK appeal to the LLCC 2009, 20 September 2010.

mitigate any incentives for pricing in a way that may be detrimental to competition in the market.[39] The table at paragraph 1.81 of the 2013 BCMR statement provides full details of Ofcom's choice of baskets, sub-baskets and sub-caps.

Therefore, it is clear Ofcom made a considered and deliberate regulatory decision to set existing regulatory controls on active services to allow BT flexibility to recover common costs efficiently across different services and to manage the efficient migration of customers from its legacy services to those based on new technologies, and it has been reconfirmed over a number of market reviews. Ofcom has made a positive case for the advantages associated with its choice to use a relatively broad tariff basket charge for price controls in the Business Connectivity Market as compared with alternatives such as separate price controls for individual services or very narrow baskets.

3.1.2 Impact of passives on the existing bandwidth gradient

Depending on the form and the pricing structure adopted, passive remedies would likely constrain the pricing flexibility afforded to BT by tariff basket charge controls and force it to shift away from the current bandwidth gradient for active services, rebalancing its prices.

Passives could force BT to rebalance its prices

Box 2 below, presents a simple pricing framework to demonstrate how, in theory, the introduction of passive remedies could in some cases require BT to shift away from its existing pricing structure and rebalance.

Efficient entry cannot be achieved once there are pricing imperfections. Where there is a regulatory or pricing failure of some form, BT will typically be forced to rebalance its prices to ensure that it continues to recover its common costs. The example in Box 1 shows that at one extreme, with a perfectly set 'active minus' price for passive access, entry will be efficient and BT's ability to recover common costs efficiently remains unchanged. However, in practice there will be uncertainties regarding the setting of the passive access prices, which will also be highly geographically averaged. Given that passive access service would be used to compete with

[39] In setting these charges, Ofcom considered, inter alia, the competitive conditions for services being combined into baskets to limit opportunities for anti-competitive pricing. Furthermore, Ofcom considered the relative proportions of these services consumed 'internally' by BT and 'externally' by downstream competitors to determine the extent to which BT could set prices within the charge control to favour its downstream operations at the expense of its competitors.

BT's active access services, a uniform price for passive access together with the existing structure for active access services would lead to selective entry given the scope for regulatory arbitrage.

We also explain why such pricing would provide scope for selective entry and cherry picking and why BT would be forced to alter the structure of its active prices in response.

Box 2: Price rebalancing - a simple framework

Stylised model of pricing for active services

The costs associated with an active access services are a share of duct and fibre common costs, a share of other core common costs and the cost of electronics (assumed to be dedicated to that particular service and so an incremental cost).

Suppose there are just two variants of the active service – High Bandwidth active access (A_H) and low bandwidth active access (A_L). These services share the same common costs (C) and but have different incremental costs e_H and e_L (the electronics costs associated with the provision of high and low bandwidth active services respectively).

Suppose that, under the existing pricing regime, wholesale active access prices share recovery of the common costs:

$$P_{AH} = \lambda C + e_H \qquad P_{AL} = (1 - \lambda)C + e_L$$

where the parameter λ shares out common costs according to relative price elasticities to achieve (reasonably) efficient pricing (i.e. proportionally more common costs are recovered from the less price sensitive services – in this case the higher bandwidth active access services).

Pricing of passives

Suppose passive remedies are introduced and with a price (P_{pass}) that is compatible with the current pricing of actives (an 'active minus' pricing approach as described by Ofcom). This would set $P_{Pass} = \lambda C$.

Under these specific assumptions, entry via the take up of passive access will be efficient and occur where third parties can provide the electronics functions more cheaply (or extend this functionality). Therefore, passive access and the high bandwidth active service A_H will be substitutes.

If substitution is perfect, the optimal balance of common costs across the A_H and Pass group of services and the A_L services (ie. the choice of λ) will not be disrupted and BT can continue to recover its common costs efficiently.

However, if P_{Pass} is set outside of the existing pricing regime, then rebalancing of the bandwidth gradient may be necessary. For example, if P_{Pass} and P_{AH} are not closely linked, substitution may no longer be 1:1 and the current balance of λ may not allow for the efficient recovery of common costs.

For example if P_{Pass} is set below λC, then BT would not recover it common costs, creating a downside risk. Moreover, in this case BT would have an incentive to lower λ, the share of costs recovered from the high bandwidth service (assuming this did not lead to a corresponding reduction in the passive price) to stem the loss of margin.

This is an asymmetrical risk, in that if P_{Pass} is set above λC then there would be little take up of passives and so no offsetting upside benefit to balance the downside risk if P_{Pass} is set below λC.

Geographical averaging and selective take-up of passives

To the extent that physical infrastructure costs vary by geography, but prices are geographically averaged, a further issue is selective take-up of passives in geographical areas where the costs of physical infrastructure are relatively high. This creates the further problem that the average cost of the passive product may not be well measured by the average cost of physical infrastructure used currently for the high-bandwidth active service. This provides a further incentive for BT to shift cost recovery onto the low bandwidth product to stem the loss of margin due to take-up of passives.

As these simple examples illustrate, the introduction of passives risks distortions and may require BT to rebalance its active prices and move away from the existing bandwidth gradient. The price of high bandwidth services be likely to decrease, and in order to ensure that it recovers its common costs, there would need to be a corresponding increase in the price of other services (the lower bandwidth active access services).

To the extent that the existing structure of active prices is reasonably efficient, there will be an efficiency cost resulting from lost consumer surplus; the gains from some customers paying less will be outweighed by the loss from other customers paying more. Higher prices for low bandwidth circuits may be particularly concerning given that there are a greater number of low bandwidth circuits than high bandwidth circuits.

To the extent that BT cannot recover common costs through increasing the price of low bandwidth services (given that greater price sensitivity and the availability of substitutes including residential broadband at the lower end), there may be wider reaching impacts in the form of a more general rebalancing of prices that could involve price increases in other markets.

Scale of the impact depends on form of passive remedies

It is clear from the above that the scale and likely magnitude of these impacts will depend on the exact form and pricing structure of the passive remedy. A distinction should be made between the likely impact of introducing passives in the form of duct access or dark fibre, as these would suggest rather different pricing models.

Access to duct would most likely be priced through a bottom-up costing approach…

Given that duct costs are fixed and common across all of BT's core services, the duct cost recovered from a given active service is weakly related to the duct actually used to deliver the service, making it difficult to price access that is not sensitive to cost allocation choices. The access price for duct is more likely to be set as a bottom-up cost because the cost of duct access consumption is primarily driven by specific distance and usage considerations and the associated operational activities for that segment (for example, duct unblocking, manhole construction, etc.). It is clear that this is difficult to square with current pricing for active services.

…this creates substantial risks of lack of coordination between the pricing of active and passive products, constraining active pricing.

Furthermore, there is likely to be significant complexity associated with a pricing structure for duct access that accurately reflects available capacity and the opportunity cost of making new capacity available. For example, there may be significant survey costs associated with identifying available capacity, capacity is likely to be highly localised and vary significantly between ducts even in the same geographic area, and the costs of civil works will vary significantly across locations. Given the complexity associated with a highly localised pricing structure for duct access, it is likely that duct prices will have to be geographically averaged. Any practicable pricing regime (i.e. geographically averaged uniform price) would be highly susceptible to regulatory arbitrage opportunities and affect BTs ability to maintain geographic averaging of its active access services.

The risks could be mitigated to some degree with pricing dark fibre on an 'active-minus' basis…

In contrast, setting prices of dark fibre that are closely related to the active service may be more feasible and have less of a disruptive impact on BT's existing pricing structure. However, in reality there is a wide range of active access services with different prices. Therefore, the price for dark fibre would have to be set in relation to a reference product.

…however, depends on the choice of reference product

In the preliminary consultation, Ofcom has put forward three possible options for a 'reference product' that could be used for the 'active minus approach'. Ofcom suggested:

- on each product individually where the price would depend on the downstream service being provided;
- on a basket of active products;
- using a single reference product and prices are the same regardless of the downstream service being provided.[40]

Pricing based on use could be complex and require significant administrative and monitoring costs and create issues where CPs seek to upgrade services in future. In the case of duct access, it is particularly difficult to see how the usage of duct could be

[40] See paragraph 7.25 of the preliminary passives consultation.

monitored. Even with dark fibre access, monitoring would require equipment to be installed along the fibre resulting in a situation somewhat similar to existing active services.

Pricing based on a basket of active services would not deal with the issue of arbitrage opportunities or inefficient entry, as there would be some active services that CPs could provide at lower cost using passives rather than using BT's active service, even where they face a higher incremental cost to BT in the active layer.

The remaining option - to use a single reference product – is less problematic in practice, but still involves a decision about whether to choose a high or a low bandwidth product as the reference. Setting prices based on a very high bandwidth service would risk choking off demand for some passive services where CPs were hoping to provide lower bandwidth services, thus potentially limiting any benefits to be realised. Setting prices in relation to a low bandwidth active price runs the risk of the passive price being too low such that inefficient entry may still occur. As we have seen above, there are potentially adverse consequences from inefficient entry.

Therefore, the choice requires a balancing of these risks and proportionality considerations become relevant. Given that higher bandwidth services would likely be more attractive and given the significant risks associated with encouraging inefficient entry, a higher bandwidth variant would appear to present the better choice of reference product.

Risks remain due to the uncertainties in measuring costs and setting access prices

While dark fibre with active-minus pricing based on a reference product of a high bandwidth active service would seem to provide the least scope for distortions, it is unlikely that any practicable pricing regime will be perfect and it is clear that the introduction of passives could have a major impact on prices and the bandwidth gradient for active services and potentially in wider reaching markets.

3.1.3 Is reducing the bandwidth gradient a cost or a benefit?

Given that the introduction of passives carries a significant risk that it would constrain BT's ability to price its active services in line with the current bandwidth gradient, BT would lose the flexibility afforded to it under the existing regulatory regime. To the extent that there are benefits associated with this pricing flexibility, introducing passive remedies could have detrimental impacts.

Current active prices are reasonably efficiently structured…

As explained above, the current pricing structure has been justified by Ofcom and is structure is the result of a long history of regulatory decisions and so it is appropriate to consider the current pricing structure as being efficient. Therefore, under these circumstances, it is reasonable to assume that imposing additional constraints on pricing flexibility would be detrimental; otherwise this begs the question of why additional constraints had not been previously imposed in the design of the price cap.

In the CfI, a number of respondents have asserted that reducing the current bandwidth gradient for active services might be a benefit, rather than a cost, of introducing passive remedies. However, this is faulty logic, as if there were benefit to changing the bandwidth gradient, then it would be necessary to consider changes to the current regulatory structure for active services as an alternative – passives are not the only option available.

Issues raised in the CfI

The Frontier Economics report provided alongside Vodafone's response to the BCMR CfI presents a number of arguments why they believe rebalancing would not lead to efficiency losses.[41] Talk Talk Group made similar arguments in their submission, while Colt[42]

[41] See section 3.2.3 of Frontier Economics report – Annex 2 of Vodafone's response to the BCMR CfI.

[42] For example, Colt argued that: *"The "cost", in terms of the disruption to the price control itself depends on a view being taken on the virtues of the existing price control…Any evidence that there may be that BT's pricing structure is efficient (and we have seen no serious attempt to establish such evidence) is counterbalanced by equally strong (if not stronger) evidence that BT's pricing structure is in fact not efficient. In other words, equally powerful arguments can be advanced that BT's pricing structure wants disrupting."* See page 11 of Colt's response to the CfI.

and UKCTA[43] made some broad comments pointing to the lack of evidence that the existing regime is efficient.[44]

Optimality of common cost recovery

Several of the issues raised by the CPs amount to concerns about differential competitive conditions across the services within the basket. For example, where services are used in different proportions internally and externally to BT, where certain services are used only by downstream CPs that compete directly with downstream BT, reducing prices where competition is stronger, and where BT's revenue maximising level of prices will differ from the level of prices that maximise total welfare.

Whilst it is true that firm-level and market-level elasticities will typically differ,[45] the relevant question is whether the discretion given to BT will lead to a superior pricing structure, by virtue of being able to use information available to it about pricing conditions, than would a less flexible approach (for example, with individual services being separately price controlled). In this regard, what matters is the structure of *relative* price elasticities across different services and whether these relativities are sufficiently similar at the market-level and as faced by Openreach. If these *relativities* are broadly similar, then the pattern of common cost recovery should be roughly efficient. Notice that we should not set a standard of outcomes being full efficiency, as the relevant test is whether a delegated approach in which the pattern of common cost recovery determined by BT is superior.

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[43] For example, UKCTA commented, *"forcing an inefficient structure of pricing would only be a concern if BT's pricing structure is already efficient (or at least, more efficient than it would be if passive remedies were to be applied). We have seen no evidence that BT's pricing is efficient and some evidence indeed that it is not."* See page 2 of UKCTA response to the CfI.

[44] We consider that the arguments put forward by the respondents can be summarised as follows: Where non-charge controlled services are partial substitutes, BT may have an incentive to set higher prices for the charge controlled service; Competition from infrastructure based providers for the regulated services mean that BT's revenue maximising level of prices will differ from the level of prices that will maximise total welfare; Openreach has an incentive to adopt steep price gradient to impede competition by raising relative prices on products that are used more by external customers; Openreach will have an incentive to adopt a steep pricing gradient to reduce prices for low bandwidth products where the more homogenous nature of the product means that competition is stronger; Openreach may engage in regulatory gaming and may have adopted a steep pricing gradient in order to discourage Ofcom from introducing passive remedies (such as dark fibre). Openreach may also have an incentive to game the 'prior year weighting' method used in the charge control.

[45] Frontier Economics argue BT's revenue maximising level of prices will differ from the level of prices that will maximise welfare because BT is responding to firm-level elasticities rather than market-level elasticities. See paragraph 107 of the Frontier Economics report submitted with Vodafone's response to the CfI.

Turning this around, it is true that there would be good reason not to use a basket price cap in the case where relative firm-level elasticities across different services (within the baskets) differ substantially from relative market-level elasticities. This situation would suggest that the extent or nature of competition was significantly different for those different services.[46]

However, these issues are precisely the issues that Ofcom should have, and did, consider when designing the pricing regime. Ofcom considered many of these issues at the time of the 2013 BCMR and where it found there to be a legitimate concern, it took action to limit BT's ability to take advantage of the pricing freedom afforded to it within the wider tariff baskets charge controls. For example, Ofcom considered whether competitive conditions differed significantly across services and considered the need to impose additional controls. Ofcom subsequently defined a number of sub-baskets and imposed sub-caps on certain services within these baskets to mitigate any incentives for pricing in a way that may be detrimental to competition in the market.[47]

Proportionality

The arguments put forward by the CPs do not provide sufficient evidence to show that BT has abused the flexibility afforded to it, that the existing regime has not or cannot address the concerns

[46] For example in Armstrong and Vickers (2001, section 4) it is shown that in competitive environments, firms might be forced to set a lower price in the "wrong" market (i.e., in the less elastic market) since firm-level elasticities might differ drastically from market-level elasticities. This is in contrast to the case with monopoly (where firm and market-level elasticities are by definition the same) the firm generally sets high prices in the correct (inelastic) markets. See M. Armstrong and J. Vickers, "Competitive price discrimination" RAND Journal of Economics Vol. 32, No. 4, Winter 2001 pp. 1–27.

[47] For example, in the TI basket, Ofcom recognised that Radio Base Station (RBS) backhaul services are sold only to external customers i.e. mobile operators (unlike PPCs, also included in the TI basket, that are provided both internally and externally). Ofcom recognised that, "…there may be an incentive for BT to concentrate price reductions on PPCs, rather than RBS backhaul services" and deemed it appropriate to have an explicit safeguard within the charge control to counteract this incentive. Ofcom proposed to include RBS backhaul within the TI basket but to impose a sub-basket cap that was consistent with the overall TI basket cap. Within this sub-basket, Ofcom also included Netstream 16 Longline and SitConnect products as there were in the same market and were only used for external consumption by mobile operators such that, "BT does not have incentives to discriminate in favour of a particular product or subset of products in order to gain a competitive advantage". In this case, Ofcom also applied a sub-cap on each and every charge of RPI+10% to control for products with the sub-basket that had a small weight. See paragraphs 19.59 and 19.94-19.96 of the 2013 BCMR.

raised, or that passives are the best way of addressing these potential issues.

Even if current prices were not, reasonably efficiently structured, reducing inefficiency is not necessarily a benefit of passives.

Even if there were deficiencies found with the current approach, such that current pricing structures for active services were *not* efficient, and even if changes resulting from introducing passive remedies led to more efficient prices, this cannot necessarily be ascribed as a benefit of passives *per se*. If this situation were to arise, then Ofcom would first need to consider the potential for adapting the price cap structure for active services to create a more efficient pricing structure and judge passive remedies taking that improved benchmark as the counterfactual. The need to consider an appropriate counterfactual is very important if any assessment of passive remedies is going to ensure that regulation is proportionate.

If there were convincing arguments that the current regulatory structure for active services is too permissive – which does not appear to be case given the number of times that Ofcom has considered this structure – this does not amount to a case for passives, but rather a case for reconsidering the structure for regulating active services.

Given the more intrusive nature of passive remedies and difficulty of rolling back passives once introduced, it is important that the appropriate counterfactual be considered, which should involve active remedies being used in their best available form. Considering a sufficient range of options is necessary for Ofcom to regulate proportionately.

3.2 Operational and cost impacts

In the preliminary consultation, Ofcom has recognised that there are some significant operational issues associated with the introduction of passive remedies. Not only the administrative effort in terms of developing a review process following the development of a draft reference offer,[48] but also the arrangements for construction and management of new infrastructure[49] and possible re-engineering of BT's business processes.[50] With multiple access remedies, there would be greater complexity in the operational process to support both circuit provision and for repair. Indeed, the introduction of passive remedies could lead to significant re-

[48] See paragraph 6.36 of the preliminary passives consultation.

[49] See paragraph 6.21f of the preliminary passives consultation.

[50] See paragraph 6.32 of the preliminary passives consultation.

structuring and changes to the way in which both Openreach and downstream BT may operate.

Openreach benefits from system-wide operational control

More generally, at present Openreach has system-wide operational control of network assets and there are benefits associated with being able to make decisions based on efficiency of the entire network. For example, suppose that, in providing active services, Openreach has to provide a connection between two specific physical points. Openreach will typically have some flexibility over how it routes its fibre as long as the connection is provided and meets its speed and capacity requirements.[51] Openreach can make fibre routing choices that make the most efficient use of its *overall* network, balancing the costs of re-routing versus the costs of expanding duct capacity on the most direct routes or at choke points. Where it is cost efficient, Openreach could avoid creating unnecessary choke points by taking advantage of routes where there is available capacity. Such strategies may also be important to maintaining spare capacity to facilitate providing services in a timely manner.

It is plausible that Openreach's current routing and capacity planning approaches would need modification to best cope with demand arising from passive remedies. For example, a CP might overlay demand for passive demand fibre/duct arising from a quite different network topology from BT's own; this might fundamentally change the probabilities of capacity tight spots occurring at different locations.

Loss of this control could lead to reduced asset utilisation and greater unit costs

Loss of this system-wide operational control, and imposing constraints on BT's ability to make decisions based on the efficiency of the entire network, could lead to higher costs than necessary and potentially greater overall costs of provision with a likely knock-on effect on prices faced by end users. It is reasonable to assume that there would be less predictability about where and when tight spots in the duct network might occur, which in turn may require proportionally larger amounts of spare capacity to be carried (for example, by building assets ahead of demand to a greater extent) in order to mitigate these risks. Such effects ultimately lead to reduced asset utilisation and greater unit costs; ultimately these need to be recovered from the users of services.

[51] Certain customers may have latency requirements that affect physical routing, but this typically limited to niche applications, for example high-frequency financial trading.

Fault identification would be significantly harder and may be more costly

Currently there are benefits associated with BT being able to monitor the provision of all of its active services across the entire network and locate the source of any faults (for example physical damage to the duct affecting a number of circuits). For example, consider two circuits A and B, which provide access between separate locations but are routed through the same duct at a certain point. If both circuits A and B display faults then BT may be able to narrow the location of the fault to the areas where these circuits share infrastructure. However, if BT was forced to remove its monitoring equipment from services provided to CPs in the form of dark fibre, and the monitoring and fault diagnostics left to individual CPs, in the absence of information sharing requirements between operators these benefits would be lost and less information is potentially available to identify and locate faults.

Without Openreach's own electronics on the ends of fibres BT expects fault identification would be significantly harder and BT would be in a weaker position to protect itself from SLA penalty claims that it would be unable to verify.[52] Without BT's monitoring and diagnostic capability BT will be totally reliant on CPs providing relevant information about the fault with a risk of errors in the reporting resulting in higher costs associated with diagnosis and the a longer time to resolve any issues. Therefore, depending on the extent to which Openreach has to hand over operational control to users of passive remedies, there is a risk of higher end prices and poorer quality of service to end users – contrary to the claims of some CPs.

Costs will be incurred regardless of actual take up of the passive remedies

When assessing these costs within its overall assessment framework, Ofcom must determine not only the scale of these costs, but their timing (in particular whether Openreach would incur these costs only if demand for a passive service has materialised or in any case) and how they could reasonably be recovered. In many cases, the implementation costs associated with changing Openreach's business processes will be incurred regardless of whether demand for passives is realised. Many transition costs could not be recovered if there was little demand for passives or if passive remedies were subsequently unwound.

Added to all these costs faced by Openreach, many of which will have to be incurred regardless of any actual demand or take up for passive access, are the regulatory resource costs of Ofcom and the industry in terms of managing the transition, setting price controls and dealing with disputes.

[52] There is a detailed discussion of the likelihood of limited benefits from innovation in Section 5 of BT's response to this consultation.

3.3 Competition and entry

Greater competitive pressure could lead to improved productive efficiency

One argument raised in favour of passive remedies is that it will encourage infrastructure competition, as CPs can benefit from being less reliant on BT's wholesale services and the introduction of passive remedies could lead to productive efficiency benefits in the form of lower costs and prices over time, as more of the cost stack is exposed to competitive pressure.

Ofcom considers that if more elements of the network are contestable, competitors could, "*take advantage of opportunities to make additional efficiencies over BT, for example in relation to equipment used or making the aggregation of capacity more efficient according to their own individual network requirements*"[53] and would allow CPs to take more control than under the active regime. An increase in genuine competition within the value chain could put greater competitive pressure on BT and others in the market providing greater incentives for cost reduction feeding through to lower prices and greater consumer surplus benefits for end users.

Passive access could reduce barriers to entry to investing in alternative infrastructure, this does not necessarily represent a benefit over and above that that can be achieved through active remedies. As Ofcom acknowledges, this is not a benefit exclusive to passives; active remedies also lower barriers to entry.[54]

CPs have also argued that there may be some further cost reducing benefits as duplication of elements for network monitoring would be avoided on the basis that Openreach's monitoring equipment would not be needed as well as the CP equipment. However, as discussed above, and discussed in detail in BT's response, it is not clear that the removal of Openreach monitoring equipment would necessarily result in lower costs given the significant difficulties that would be associated with fault monitoring, identification and resolution.

In theory, there may also be dynamic efficiency improvements as a result of greater scope for innovation further stimulating competition. We discuss the scope for innovation benefits in more detail in sub-section 3.5 below.

[53] See paragraph 4.28 of the preliminary passives consultation.

[54] See paragraph 4.27 of the preliminary passives consultation.

Passives may not be genuinely pro-competitive if they promote inefficient entry

However, when assessing the competitive impacts it is important to consider whether the introduction is in fact genuinely pro-competitive, as opposed to benefiting only certain CPs, and whether the introduction of passive remedies would lead to the expansion of competitive supply areas.

Genuine competition on the merits requires that entry should occur where CPs can provide the active services at an incremental cost equal to or less than that of BT (i.e. entry will be efficient and allocative efficiency promoted). However, as demonstrated in Section 3.1 above, depending on the form and pricing structure of passive remedies, there may be scope for inefficient entry.

Instead of competition 'on the merits' competition may only be a result of exploiting differences in the pricing structures of products downstream and passive access products upstream

Due to limitations on the complexity of the pricing structure, there will always be arbitrage opportunities. CPs will likely only provide new or equivalent services in areas where a significant proportion of the total cost of active access is contestable. This will likely be for high value services where the gap between the passive and active prices on a per circuit and/or per customer basis is greatest or in high-density areas. Instead of competition 'on the merits' competition may only be a result of exploiting differences in the pricing structures of products downstream and passive access products upstream.

Note that the situation here differs from the opening up of a 'textbook' value chain that opens up downstream activities to potentially more efficient operators. Such a situation can occur if and only if there is an efficient access price that allows efficient entry. Once there are pricing imperfections and constraints, including geographic averaging, then regardless of how access prices are set, there cannot be perfect discrimination between cases where entry is efficient and those where it is not.

CPs could benefit significantly if passive access was introduced with an imperfectly regulated access price that was sufficiently low or that would allow CPs to take advantage of lack of cost reflectivity in the pricing of passive access and engage in arbitrage. The benefits for specific CP from such arbitrage opportunities passives are not the same as competitive benefits in the market as a whole.

CPs benefit from having the option of passive access, but this does not necessarily mean there would be pro-competitive benefits

Unless a CP has its own investments in infrastructure that could be at risk from passive remedies being imposed on BT, many CPs would benefit from having the *option* of passives, even if they did not use them. For example, uncertainty in setting access prices for passives means that there is always a chance that passive access could be prices sufficiently low to be an attractive alternative to active access services. With the ability to pick and choose which access service is used, introducing a greater range of access services may be a one-way bet for users. However, this does not necessarily mean that there is a pro-competitive benefit. Indeed, where entry is inefficient there may be negative consequences, not least for potential increased industry costs, but also through the erosion of investment incentives. Therefore, Ofcom must distinguish between

genuine competition benefits arising from efficient entry and the benefits to individual CPs as a result of regulatory arbitrage opportunities.

3.4 Infrastructure investment

Given that Openreach and other CPs have invested in their own infrastructure under the existing regulatory regime, and given the desire to promote infrastructure competition in the long term, Ofcom must consider the impact of passive remedies on investment incentives both of BT and other CPs.

Uncertainty in the setting of access prices in unavoidable and incorrectly set access prices (be they too high or too low) may take some time to rectify, as methodological issues would typically wait until the subsequent market review before resolution. However, by creating parallel interventions in the same value chain, with different access products being potential substitutes, the risk of depressing infrastructure investment incentives through at least one of those access prices being under priced is exacerbated. There is an asymmetric risk, as the demand for access products is clearly related to their price. If this price is set too low, there will be demand and potentially also substitution from other access services; however, if it is set too high, then there will be little or no demand. Therefore, the noise in the setting of regulated access prices will tend to depress expected asset returns due to the asymmetric effects of prices being set too high or too low.

Inefficient entry and investment incentives

As we have demonstrated above, because of practical limitations in setting sufficiently geographically differentiated prices, entry based on passive products may not always be efficient.

The potential for inefficient entry leads inevitably to erosion of investment incentives as it introduces inefficient competition thus reducing the return on efficient network investments. This is true both for Openreach and alternative infrastructure providers.[55]

[55] For example, Virgin Media, who has made significant investments in alternative infrastructure to compete with Openreach, has also raised this concern: "introducing passive remedies would mean ignoring the costs already incurred by other CPs in building alternative infrastructure. The creation of widespread infrastructure access through passive remedies could, if structured in an inappropriate manner undermine genuine network investment" (See Virgin Media's response to the BCMR CfI pp 7-8). Ofcom has also recognised these risks in Section 5 of its Passives consultation.

There is a particular danger that passives are attractive in geographic areas with emergent infrastructure-based competition, and that introduction of passive access in these areas could distort investment incentives and limit the potential benefits from full-infrastructure competition that would otherwise materialise.

Whilst geographic differentiation could theoretically limit the risks associated with passive access remedies,[56] the practical application of this approach relies heavily on Ofcom getting its geographical market definition and competitive analysis correct. However, Ofcom's analysis of competitive supply areas has in the past tended not to identify high network reach areas where there are pockets of existing competition.

Inadequate identification of islands of potential competition

DotEcon have previously raised concerns with Ofcom's approach to the identification of competition in the previous BCMR. We demonstrated numerous sources of bias that tended to tip Ofcom's analysis away from finding competitive conditions in the supply of specific services in specific locations:

- Ofcom's use of businesses with over 250 employees as a proxy for demand was not representative of demand from businesses with fewer employees but significant communication demand;
- Ofcom tended to miss clusters of competitive supply due to geographical averaging. This was a bias, as it created a tendency to misidentify competitively supplied areas as uncompetitive, but did not make the countervailing error of misidentifying uncompetitive areas as competitive;
- This bias was further compounded by the requirement of geographical contiguity that Ofcom imposed on areas of competitive supply;
- This bias was more significant for higher bandwidth products where customers are fewer in number and so tend to be more geographically isolated;
- Ofcom's "cross-checking" by comparing market shares inside and outside an area of putative competitive supply created an additional bias. We illustrated that this method

[56] Both Virgin Media and Ofcom have proposed introducing a more targeted passive remedy, which differentiates access on a geographic basis depending on the differing competitive conditions. In Ofcom's view this "would allow for the protection of investment (or investment potential) in relevant areas, whilst lowering barriers to entry in areas where competitive entry through network build would not be viable." See paragraph 6.18 of Ofcom's Passives Consultation.

is fundamentally biased towards drawing the boundary of the competitive area too tightly.[57]

Ofcom needs to consider its approach to the identification of competitive supply areas much more carefully if this were to form the basis of the geographical scope of any passive remedy.

Given the biases inherent in Ofcom's methodology for geographic market definition, CPs who have invested in such high network reach or emerging-competitive areas that are missed in Ofcom's analysis will be severely disadvantaged if passive remedies are introduced in these areas. Ofcom would need to consider its approach to the identification of competitive supply areas much more carefully if this were to form the basis of the geographical scope of any passive remedy.

We fully acknowledge that Ofcom has yet to provide significant detail about the methodology it will adopt to define geographic markets in the upcoming market review. Nevertheless, even in the best case, there is likely to be some uncertainty and ambiguity over the definition of geographical markets that is unavoidable that will inevitably interact with any passive remedy to undermine incentives for infrastructure investment at least at the boundaries of competitive supply areas; impacts may be much wider if competitive supply areas are defined too narrowly. Any passive remedy that is incorrectly introduced in these emerging competitive areas is likely to undermine potential for genuine infrastructure investment, as these are the areas where passives would be taken up (due to geographical averaging).

Ofcom should be careful not to undermine genuine infrastructure investment, as it provides clear benefits over and above competition based on passive access. For example, within WECLA the presence of a number of networks with quite separate physical infrastructure and different topologies provides possibilities for enhanced resilience (through multi-sourced connectivity) and service differentiation for niche customers (e.g. low latency services for the finance industry).

Risks associated with irreversible investment

"Fair bet" considerations

Openreach will have built spare capacity into its network to provide for future demand. These investments are only undertaken where there is confidence that a reasonable return on efficiently undertaken investments will be made. In this sense, Openreach investments must represent a "fair bet" at the point they were made. Changing how those assets might be used in future has the potential to revise the terms of that bet and even to expropriate

[57] We covered these issues in a report provided to BT on the 'Economic aspects of Ofcom's proposals in the BCMR', DotEcon, 13 September 2012.

part of the value of those assets. Ofcom has rightly been concerned to avoid creating such uncertainty by promoting regulatory predictability.

Ofcom considers that passive remedies will not necessarily "violate" the fair bet principle because it "*could seek to approach any pricing of passive remedies (and also the pricing of active remedies, if considered appropriate) in a way which allowed BT the opportunity to recover its efficiently incurred costs.*" However, our discussion in Section 3.1 above has shown the significant difficulties associated with setting prices of passive and active access without significant adverse consequences, including scope for inefficient entry, which in turn would lead to adverse impacts on investment incentives.

Stranded investments

Introducing any new remedy, such as passive remedies, even if it is targeted in specific areas could lead to stranding of investments made under the current regulatory regime. Openreach has considerable equipment already in its installed base which could be stranded were passive services and in particular dark fibre to be provided effectively on demand. To not undermine future investment incentives, the costs of these stranded assets would need to be recovered either in the passive access price and/or from other regulated services. Ofcom claims that it would "*would want to be mindful of how [it] introduced passive remedies so as not to unduly distort future investment incentives.*"[58] However, it does not elaborate on how it would do this and/or what impact this might have.

Furthermore, as noted by BT, Ofcom fails to recognise depending on the exact form of the passive remedy, the overall shape and size of the existing network may no longer be appropriate. For example, has BT known that its network would be used to provide dark fibre access it may have designed its network in a different way than it has been. The existing network has been designed and evolved to provide active products efficiently.[59] Therefore, the identification of stranded assets may not be as simple as identifying particular network elements that are no longer required. Ensuring that BT is able to recover the costs of stranded assets adds a further layer of complexity to the choice of active and passive prices going forward.

Loss of future option value

BT's physical infrastructure investment, in particular duct, involves significant sunk costs associated with digging new duct. Therefore, BT places a considerable option value on unused capacity in its existing ducts. If Ofcom were to impose passive remedies and set regulated prices for access to duct, an efficient price would have to

[58] See paragraph 5.7 of the preliminary passives consultation.

[59] See paragraph 5.59 and 5.61 of BT's response to this preliminary passives consultation.

take into account the real option values associated with this spare capacity. If the price does not take into account the real option values associated with this spare capacity and the introduction of passives uses up this spare capacity this could distort BT's future investment incentives.

3.5 Innovation

In theory, passive remedies would give CPs greater control of the underlying infrastructure. This could have an impact on the level of competition if it leads to a reduced reliance on co-operation of the underlying network owner, increased competitive pressure on costs, increased opportunities for innovation and allows CPs to differentiate services to end users. Greater scope for innovation and improvements in service quality may lead to greater dynamic efficiency. For example CP's have argued that the introduction of passives access would allow significant dynamic efficiency benefits, as it will lead to: product and service innovation; network innovation; and improvements in quality of service.

Dynamic efficiency improvements as a result of product and service innovation

Dynamic efficiency benefits can be realised where passive remedies would lead to the introduction of new products or services, which would not be feasible under the existing access regulation regime.[60]

Ofcom considered that most of the benefits would come from changes, configurations or upgrades to electronic network equipment. However, we understand that such changes in configurations can also be achieved via current active access without requiring access to the physical network layer (i.e. through access to OSI Layers 2 and 3 rather than Layer 1). BT's response to this consultation provides greater details.[61] Given that most novelty in services does not require access to the physical network layer it could be achieved through active access products for example, dealt with through an SOR asking BT to enable certain functionality built into the existing electronics and network equipment.

If the provision of some new service requires access to the network layer, then this necessarily involves the technical standards and

[60] We note that Ofcom's initial view is that "[p]assive remedies may offer CPs more scope for innovation and more direct control over upgrades and reconfiguration of services than they have now with active remedies. This means that CPs would be more able to differentiate the services they offer in terms of service quality or technology deployed." See paragraph 1.15 of Ofcom BCMR Passives consultation.

[61] See paragraphs 5.13 and following of BT's response to this preliminary passives consultation.

functionality of network equipment and this will be reliant on innovation of equipment from vendors. However, there is a global market for such equipment and manufacturing is subject to strong scale economies and timetables for upgrades are likely to be out of the control of individual CPs. It is implausible that the approach that the UK adopts to passives could have a significant impact on the incentives of the global manufacturing base to innovate at the physical network level in terms of the functionality of network equipment.

Other product or service innovations

Furthermore, there appear to be few, if any, other product or service innovations limiting the extent to which Ofcom could reasonably rely on innovation possibilities as a justification for regulatory intervention in the form of passive remedies.

There may be some examples of highly niche services that may arise in future requiring access to fibres, although their commercialisation is uncertain and possibly not likely for some time. However, by their very nature demand for such services would most likely be demanded in geographies with high network reach (e.g. financial institutions in Central London) where there would be competitive supply,[62] not in the geographical areas where SMP findings would allow passive remedies. Furthermore, consumers have the ability to, and often do, choose location if there is something truly innovative. As these niche applications are likely to occur only in competitive areas the introduction of passives will not increase dynamic efficiency on these grounds.

If specialist applications were to emerge that required corresponding access product designed for their special characteristics, then one would expect to see this reflected in the market definition at the market review stage. If a service can only use a certain type of access product, and other products are not substitutes, then this would suggest defining a separate market for access products to support that application. If there were then a finding of SMP in respect of that market, consideration would be needed of a proportionate remedy, which might involve ensuring an appropriate access product is available to suit that service.

[62] For example, Quantum Key Distribution (QKD) is an emerging technology which can guarantee secure communication between two locations, but which would require dark access to a fibre without intervening monitoring equipment to avoid disrupting the quantum state of entangled photons. However, the users of any commercial QKD service would most likely be financial institutions, public sector bodies and large corporations, all of which would likely be in competitive supply areas.

Network innovation

Colt argue that passive remedies will allow network innovation, allowing it to configure its network in a different way to BT.[63] Colt argues that duct access remedy would allow the deployment of local fibre rings, which would allow it to deliver efficiency (allowing more customers to be accessed from any given trench or cable length) as well as resilience benefits. However, the arguments are not new and similar ground was covered in the Colt Appeal. Resilience can be established using active remedies as was explained by BT and not challenged in Colt's Appeal. Given that network roll-out on a different network architecture to BT would likely lead to selective use of the passive remedy given that the architecture of the two networks will not align and there might be consequences for capacity tight spots occurring at different locations requiring BT to revise its capacity planning at some cost. We note that Ofcom has acknowledged some of these issues in its passives consultation stating that *"the scale and significance of any benefits are likely to be dependent on the practical challenges associated with deviating from BT's current network architecture, as well as the detailed implementation approach for any passive remedy (e.g. in relation to access points to BT's infrastructure)."*[64]

[63] See page 33 of Colt's response to the CfI.

[64] See paragraph 4.18 of Ofcom preliminary passives consultation.

4 Comparing costs and benefits

Trade-offs and the balancing of the costs and benefits has not received much attention to date

As a result of the 2013 BCMR, Colt's subsequent appeal, the CfI for the impending BCMR and the current consultation on passive remedies, the various sources of the costs and benefits are largely understood. However, the trade-offs and uncertainties involved in any decision to introduce passive remedies have received far less attention.

Despite stating that it will balance the different considerations when assessing the appropriateness of imposing passive remedies, Ofcom remains vague on exactly what the key trade-offs are and how it would weight costs and benefits in practice.

As we have demonstrated, the scale of the costs and benefits associated with the introduction of passive remedies is dependent on take-up and demand for passive access and heavily dependent on the specific nature of the remedy, for example the nature of costs and benefits are potentially different under dark fibre and duct access remedies, not least due to the choice of regulated access price. However, at this early stage, no specific proposals for any particular form of passive remedy have been made.

A detailed assessment of the net impact of introducing passive remedies would need to consider the impact across each of the five broad categories of issues we identified above on the basis of specific assumptions about the nature of the remedy (including form and pricing structure), its geographic availability and any restrictions on the services carried over passive access.

Comparing the costs and benefits is a complex task

However, comparing the costs and benefits within this framework will not be a straightforward task owing to the significant uncertainties about both costs and benefits and the time horizons over which any costs and benefits may be realised. Furthermore, Ofcom must also apply precaution when assessing whether passive remedies are justified and must ensure that the remedy applied is the most appropriate available option to address the specific competition issues it identifies in the market review.

4.1 Uncertainty and time horizon

There is considerable uncertainty about both costs and benefits of passive remedies, but these uncertainties are rather different in nature.

The magnitude of the costs depends on the exact nature of the remedy and the nature of demand

We can be reasonably sure that there are significant costs associated with the introduction of passive remedies. For example, it is reasonable to assume that flattening of the bandwidth gradient amounts to a significant cost (otherwise existing approaches to regulation of active products that provide Openreach with limited pricing flexibility are difficult to rationalise);[65] however, its extent is uncertain and depends on specific assumptions about the nature of demand (especially price elasticity) for different products. Impacts on Openreach's operating efficiency and unit costs are also difficult to gauge, but could have a significant associated loss of consumer surplus.

Some cost may be incurred regardless of take up of passives

Furthermore, these costs may be incurred in the short term and regardless of take-up of passives. For example, transitional and operational costs associated with Openreach and BT re-structuring could be expected to be incurred regardless of significant take-up of any passive access products. The costs associated with re-balancing of prices of actives may be incurred regardless of genuine demand in order to limit opportunities for arbitrage and inefficient entry.

Genuine benefits are uncertain and may only be realised in the long run, outside of the scope of a simple market review cycle

On the other hand, the benefits in terms of improved productive and dynamic efficiencies as a result of possible innovation, service differentiation and quality of services improvements are more speculative than costs, and there is an important distinction to be made between genuine competition and innovation benefits arising from efficient entry and the benefits to individual CPs as a result of regulatory arbitrage opportunities. Any genuine benefits are uncertain and if realised at all are likely to materialise only in the long run.

Therefore, owing to the different timeframes the costs and benefits will need to be assessed over a considerable time horizon and will involve looking beyond a single market review cycle, as acknowledged by Ofcom.[66] Furthermore, the more immediate and more certain costs ought to be weighted more heavily than the more uncertain benefits in the cost-benefit analysis.

[65] For example, given the significant weight Ofcom have placed on the pricing flexibility it chose to afford BT under its choice of tariff basket charge controls, there would necessarily be efficiency costs associated with a departure from this, and there may be additional costs associated with lost consumer surplus as a result of price changes in the market (and other markets where there is a more general rebalancing).

[66] See paragraph 1.13 of the preliminary passives consultation.

4.2 Irreversibility, precaution and proportionality

Passive access remedies will be difficult to unwind in future

Once imposed, it is likely to be burdensome to unwind passive access, or remove the passive remedies altogether, even if it became apparent *ex post* that allowing such access had led to undesirable outcomes. This differs from active access remedies. Wholesale services may be phased out or updated in line with customer needs and technology improvements, whereas the physical infrastructure is largely unchanged over long periods. It would not be reasonable, and would certainly be disputed, should passive remedies be imposed and then removed at some later date such that, for example, all CP fibre must be removed from BT duct.

There is also a clear risk that geographic and product boundaries shift between market review periods, in line with changing competitive conditions. To the extent that passives are only introduced in geographic areas with SMP determinations within relevant product markets, there are clearly further complications for how obligations to supply and any restrictions on usage would be verified and enforced over time, given the innate irreversibility of any decision to introduce passive remedies.

The risks associated with introducing passives and the uncertain benefits, and the difficulty to remove access suggests a precautionary approach should be taken

Given the enduring nature of any decision to introduce passives, the likely need for significant restructuring of regulation and with uncertain costs and benefits occurring over different timeframes, a decision to impose passive remedies is clearly a strategic regulatory decision. This situation strongly suggests applying a precautionary principle to the introduction of passive access remedies.

A precautionary principle suggests that the expected benefits would need to exceed expected costs to a sufficient extent for introduction of passives to be justified. This reflects the lost option value of any decision to introduce passives, in that the possibility of waiting and making a decision at a later time with better information is foregone.

Furthermore, measures to de-risk any decision need to be considered, in terms of phasing changes and consider staging posts along the way, rather than facing the unmitigated risk of dislocating change that is difficult to reverse.

Passives are unlikely to be the only option to address a specific competition issue

In this regard, if the prompt for consideration of passive remedies is a specific competition problem, then it is important to consider whether there are other, less risky, approaches (for example, changes to active remedies). Passive remedies are likely to be more intrusive and riskier in terms of unforeseen impacts than active remedies and proportionality requires consideration of all the alternative remedies.

Proportionality is important

The principle of precaution and need for proportionality of any remedies both suggest similar approaches. Any case for passive remedies should address a specific identified competition problem and demonstrate that it is the best response to that problem. The relevant counterfactual for considering passive remedies is a well-designed system of regulation for active access products.

Ofcom should not simply assess the costs and benefits of passives in isolation, but must consider whether it could meet its objectives through alternative interventions that would be less risky and have a greater overall benefit. Given a particular competition problem, there will be a variety of potential remedies, such as changes to the range of active access products or their system of regulation.

Where there is a genuine concern that Ofcom is seeking to address, it may be that there are a number of potential alternatives short of passive remedies. For example:

- Term and volume discounts on actives might be beneficial in encouraging complementary infrastructure investments by other CPs (a point made by BT in its submission to the CfI);
- There is the option of requiring specific active products, for example to support mobile backhaul, if a particular competitive problem were found in a properly defined relevant market;
- Ofcom may re-define the baskets, sub-baskets and sub-caps for the charge controls for regulated active access services.

On the basis of precaution and proportionality, many of the arguments advanced in favour of passives are not coherent. They could be addressed through less intrusive modifications of the current regulatory structure for active services.

4.3 Burden of proof

To justify the introduction of passive remedies Ofcom must provide clear evidence to demonstrate why this more intrusive regulation is the most appropriate remedy to deal with any issues identified in its market power assessment, and that this is a proportionate remedy showing that the costs of such a change are outweighed by any benefits, and that the net benefit is greater than could be achieved with any other form of intervention.

To this end, a full cost-benefit analysis or detailed impact assessment will need to be conducted in which Ofcom compares a range of options with the existing regulatory regime to assess which remedy represents the most appropriate and best overall approach to address the nature of any market failure identified in the market analysis.

The wide ranging impacts associated with the introduction of passive remedies and the strategic nature of its decision imposes a significant burden of proof on Ofcom and it would need to demonstrate that passive remedies represent the best available form of intervention. There are a number of important steps that Ofcom must follow when undertaking this assessment.

Identify the competition problem to be addressed

Ofcom must clearly identify the competition problem that needs to be resolved based on its SMP findings derived from its market definition exercise. Only in light of this analysis can Ofcom consider the need to intervene and the form of regulatory intervention required. There will be a number of options of which passive access remedies is only one. Ofcom must also consider the existing regulation of active remedies and where these do not already address the competition problem identified, whether changes to the regulation of actives would be appropriate.

Define the exact form and nature of the passive remedy being proposed

When assessing the impact of the introduction of passives, Ofcom must clearly define the nature of the passive remedy it is proposing to resolve the specific competition issue(s) identified in the market analysis.

Until the proposals become more specific, it is impossible to consider the likely impact. Many costs and benefits are dependent on the exact nature of the passive remedy. Ofcom must define a much stronger and more developed framework and focus on a narrow selection of scenarios under which it can properly to consider these issues. For example, Ofcom will need to consider:

- the form of passive remedies - the two broad options put forward to date have been access to the duct or access to dark fibre, with dark fibre being put forward by the majority of the respondents to the CfI;
- the pricing of the passive access service including how the prices for passive access remedies will be calculated and the pricing structure - will prices be derived from the underlying costs of the active access remedies or will they be derived from a bottom up costing approach? To some extent this will be influenced by the form of the passive remedy, however Ofcom must also outline whether prices for passives be will geographically averaged or involve a degree of geographic pricing (either zonal, based on underlying civil works costs, or highly localised pricing to reflect tight spots in capacity);
- the geographical scope of the remedy – Ofcom's SMP findings to date for business connectivity services are based on an intersection of geographic and product market definitions. Ofcom has already intimated that were passive remedies introduced, they would almost certainly not be ubiquitously available, but rather limited to certain geographic areas. However, Ofcom would need to be clear how it would seek to offer passive access only in SMP areas

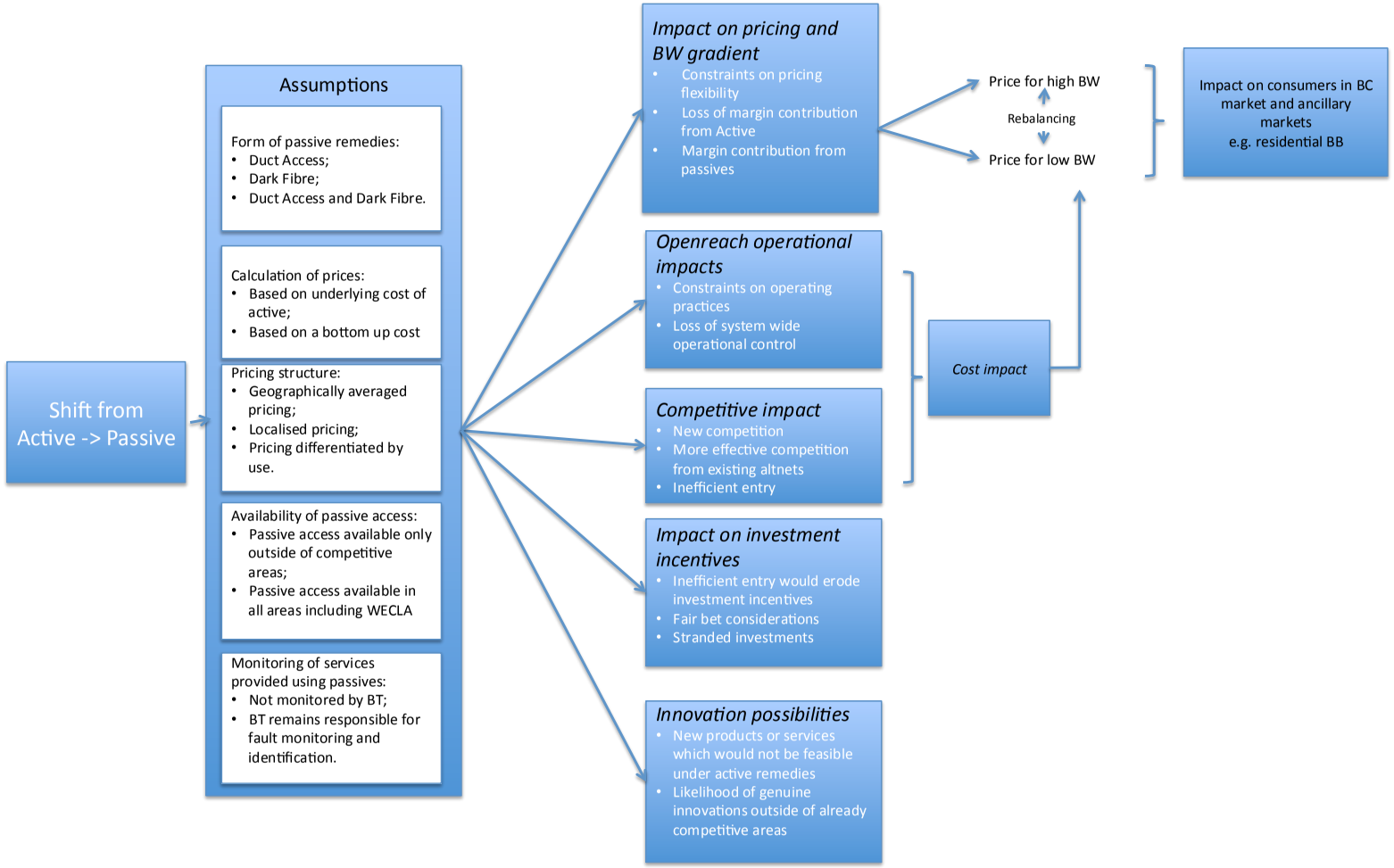
(e.g. outside WECLA) and how it would deal with cases where BT is deemed to have SMP for certain product markets even within WECLA, for example outlining any restrictions on the services that could be provided over passive access products in these (or any) area(s);

- any assumptions about actives – given that passives would be imposed alongside actives for some time, Ofcom should be clear about whether the active access remedies would remain the same and whether term and volume discounts might be available.

Establish the costs, the benefits, the key trade-offs and dynamic interactions

Ofcom must then clearly define the cost and benefits associated with introducing passive remedies in the form it has proposed and identify the key trade-offs. To determine the net-benefit of introducing passives, Ofcom must carefully consider the appropriate weight to apply to each of the issues when balancing the trade-offs in its cost-benefit analysis. In its simplest form, Figure 1 below provides an illustration of the basic structure of an assessment framework:

Figure 1: A conceptual assessment framework



Having defined the remedy and identified the costs and benefits, Ofcom must also recognise the dynamic interactions between active and passive products i.e. assess competition and innovation impacts in light of inefficient entry and pricing structures which may be created by passive remedies. For example, the costs and benefits of passive remedies need to be assessed taking into account the various limitations on the structure of access prices. There will be gains and losses. Not only may the former not outweigh the later, but there are also equity considerations across different customer groups that need to be taken into account.

Apply weights accordingly

Given the nature of the uncertainties associated with the costs and, in particular, the benefits that may arise from the introduction of passive remedies and the likely time horizons over which the costs and benefits may be realised and the difficulty of unwinding the regulation if the expected benefits are not realised, the weighting applied to the issues in its impact assessment will be of great importance for the conclusions. Ofcom must outline clearly the extent to which costs and benefits are uncertain and apply appropriate weights to each in its analysis. For example, the more certain costs that will arise in the short-medium term should be weighted more heavily than the benefits if they are uncertain and potentially only realised in the long-term.

Quantify the costs and benefits

Most importantly, Ofcom must quantify the costs and benefits where possible or provide as much transparency in argumentation as possible to show that, if it decides to introduce passive remedies, doing so would be net-welfare enhancing. This includes the costs faced to BT and Openreach as a result of restructuring, the extent to which BT would be forced to rebalance its active prices and the impact of any price increases on end users, the expected benefits in terms of innovation and competition.

For example, in Section 5 of the preliminary passives consultation, Ofcom has done some basic illustrative analysis to try and estimate the potential impact of passive remedies on common cost recovery. However, Ofcom must undertake more detailed analysis to try and quantify both the costs and the benefits, taking not just a static approach but considering changes over time including changes in volumes of active and passive services.[67].

The burden of proof is significant

It is clear that there is a significant burden of proof on Ofcom to validate the introduction of passive remedies. Given the potentially significant costs, the uncertainty of any benefits and the irreversibility of any decision to introduce passive remedies,

[67] In its section 5 of the consultation document, Ofcom has taken a basic approach and its analysis is mainly static, and does not consider the impact of changes in volumes over time.

precaution and proportionality are very important. It would be entirely appropriate for Ofcom to adopt a precautionary principle such that a sufficiently certain net benefit is required to justify adoption.

Show that the preferred form of regulatory intervention is proportionate

Ofcom must clearly demonstrate that when compared with alternatives and its statutory obligations, passives represent the most appropriate and proportionate response to market failure and will deliver net benefits to business customers and, ultimately, consumers.

Ofcom must assess any new regulation mandating passive access against changes to the existing regulatory regime for actives. Where there are genuine competition concerns identified that are not already dealt with under the existing regime, a natural question is whether the scope of active remedies or the form of price control could be beneficially altered without needing passive. For example, taking a gradual, phased approach trying active remedies first would deal with many of the issues facing the introduction of passives including issues such as the irreversibility concerns and potential wide reaching consequences of disruption to pricing and the scope for inefficient entry.