Passive Access in the Business Connectivity Market
A REPORT PREPARED FOR VODAFONE

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Executive Summary

1. The evidence and analysis in this report suggests that passive access as a remedy in the Business Connectivity Market could result in significant benefits to the overall economy by opening up a greater part of the value chain to innovation. An approach based on regulating access to ‘dark’ fibre would provide a proportionate and practical way to enable the benefits of competition in a deeper point in the value chain.

2. BT has enduring market power in a wide range of markets, including the Business Connectivity Market, deriving from its control over the underlying infrastructure used to deliver a range of wholesale and retail services. The effective use of this unique infrastructure is increasingly strategic for the whole economy, with improvements to Internet access leading to significant economy wide productivity gains.

3. Demand for bandwidth looks set to continue to increase at exponential rates, driven by consumer and business demand for data driven services and applications, and rapid technological development and diffusion of communications devices and equipment. While there has been significant policy focus on consumer level fixed access, many of the benefits derive from providing better connectivity to large business users. Services in the Business Connectivity market also play a vital role in delivering faster broadband access through mobile and fixed networks, by providing high speed transmission within these networks.

4. Ofcom’s review of the business connectivity market should take account of the broader benefits of a well-functioning market when determining the most appropriate approach to regulation. Ofcom should place high weight on the degree to which alternative approaches can allow providers to respond dynamically, nimbly and innovatively to rising demand from the heterogeneous consumers to support the UK’s transition to a digitally driven economy.

5. There are multiple levels at which access to BT’s network can be regulated, from the basic physical infrastructure such as ducts and poles; the physical cables running over this infrastructure and different levels of ‘active’ services provided over the network.

6. The current framework, based on the regulation of active products, is burdensome and does not incentivise innovation. The resulting market outcomes have not met the need of users with slow and unresponsive product development, poor quality of service and costly and time consuming processes which impede competition. The forthcoming review provides an opportunity for Ofcom to reassess the effectiveness of the current framework in the light of the increasing importance of these services.
7. Ofcom has recognised that regulating at a lower level, i.e. passive access, can bring benefits by allowing competitive providers to compete and innovate over a larger part of the value chain. Giving direct access to the underlying infrastructure would enable CPs to bypass BT’s systems in order to innovate and to provide the quality of service required by corporate customers. Competing providers would also be able to use passive access to deliver high speed broadband.

8. The example of local loop unbundling shows that the dynamic efficiency gains from mandating passive access can be significant. As described in Annex 1, ten years ago, Ofcom recognised that a bold and assertive regulatory approach was required to remedy market failures in the local access markets. Ofcom required passive remedy (LLU) and equality of access to mitigate the enduring economic bottlenecks faced by competitors wishing to enter the broadband market in the UK to compete with BT. The policy transformed the nature of broadband competition from a service based model of competition, where operators resold undifferentiated BT products, to a model characterised by investment, innovation and choice.

9. Within passive access there are various options for introducing regulated access, for example providing access to fibre cables used to provide services (‘dark fibre’) or providing access to the duct and poles so that CPs can lay their own fibre. The levels at which access to BT’s network is mandated is clearly a trade-off between costs and benefits at each level. Providing access to dark fibre may provide the best trade-off between costs and benefits, providing much of the benefits in terms of innovation while limiting implementation costs and avoiding excessive disruption in downstream markets. As such, many of the issues identified by Ofcom as reasons for not implementing passive remedies in the previous review would not apply to fibre based access.

10. Providing access to the physical fibres on cables, akin to local loop unbundling, would require relatively limited modifications to the processes currently used by Openreach to provision fibres for active products provided to CPs or BT’s other divisions or to the provision of fibre cable to BT wholesale for provision of traditional leased line services. Providing widespread access to the underlying ducts and poles could require far more regulatory intervention and process re-engineering within Openreach.

11. The prices of fibre access could be set consistent with the existing regulatory costing of fibre components of the active services, reducing the disruption from introducing passive remedies. However one of the consequences of effective regulation of fibre access would be a reduction in BT’s ability to price discriminate by bandwidth. While this could lead to some rebalancing of prices, increased competition over the active component and the resulting increase in demand may outweigh any loss in allocative efficiency. For
example, currently BT is reporting that the revenues from all EAD rental services are above fully allocated cost and as such competition from passive access would tend to lead to a reduction in all prices.

12. Setting passive fibre access prices in line with existing regulatory costing principles would not appear to be detrimental to investment in infrastructure as it should not fundamentally alter expected returns either on BT’s passive network or on competing networks. Increased innovation in the active parts of the network would be likely to boost long run investment in these assets and the networks and services that depend on them.
1 Policy Context

1.1 Benefits from improved connectivity

13. It is widely recognised that communications services are a General Purpose Technology which leads to improved productivity across the economy, in addition to the utility directly derived by consumers.

14. For example a recent report commissioned by the DCMS\(^1\) found that

> “the availability and take-up of faster broadband speeds will add about £17 billion to the UK’s annual Gross Value Added (GVA) by 2024. This level of uplift contributes an average of 0.07 percentage points to real annual GVA growth over this period.”

15. These gains were derived from a range of sources including:

- Increase in labour force participation;
- Increase in teleworker productivity;
- Productivity growth of broadband-using enterprises;
- Safeguarded enterprise employment

16. The magnitude of these gains suggests that even marginal improvements in the coverage or quality of networks can bring significant benefits. For example the report estimated that the GVA impacts attributable to the current set of publicly funded interventions rise to about £6.3 billion p.a. by 2024, which is equivalent to an uplift of 0.03 percentage points on the UK’s real annual GVA growth.

17. As can be seen from Figure 1, the majority of these gains are due to an increase in productivity growth of broadband using enterprises.

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\(^1\) DCMS: UK Broadband Impact Study Impact Report November 2013
Figure 1. Gross Value Added Impact of Broadband

1.2 Business connectivity

1.2.1 Corporate connectivity

18. The DCMS analysis above specifically excluded Internet access using those services included in the BCM, typically used by larger companies. Thus the productivity gains estimated will be associated with smaller companies. As over 50% of employees work for employers with more than 500 employees, the potential productivity gains from improving connectivity for larger organisations is likely to be of a similar order of magnitude.

19. Businesses also used BCM products for a range of other non-Internet applications from generic applications connecting up business sites such as LAN interconnection, voice and video over IP to niche industry specific services.

1.2.2 Competing Providers

20. As well as providing Internet access and connectivity between corporate sites, services in the BCM are also used to provide connectivity within the (public) networks provided by CPs. For example, Ethernet services are used to provide backhaul services from mobile base stations back to the core network and to provide backhaul services from BT sites where CPs have equipment installed using LLU to their core networks.

21. Better access to BT’s infrastructure could provide significant benefits by allowing CPs to backhaul the rapidly increasing data volumes more efficiently\(^3\). This could translate to better mobile coverage, by reducing the costs of rolling out additional base stations, and lower effective data prices on fixed and mobile networks, by reducing the incremental cost of increasing backhaul capacity.

\(^3\) For example, Cisco predicts that the overall volume of data from fixed and mobile Internet will increase three fold between 2012 and 2017.
2 The benefits of passive access remedies

2.1 Introduction

22. The benefits of physical access remedies over active are well known. This section explores the rationale for imposing physical access remedies in telecoms markets. It then considers the link between passive and active remedies, and describes the current PIA remedies.

2.2 Rationale for access remedies

23. In some telecoms markets, economies of scale and significant fixed sunk costs mean that barriers to entry are high. In such markets, the incumbent telecoms operator is likely to have a degree of market power. Access based regulation mitigates the risk of abuse of this market power by enabling competition, at least in part of the value chain.

24. As set out in Figure 2, regulated access can be provided at different points in the value chain. Access can be differentiated between access to ‘active’ network services delivered through electronic equipment, and passive access, which provides access to the underlying infrastructure or to physical transmission media (i.e. cables) without additional electronics.

25. This defines a hierarchy of products:

- At the bottom level, access to infrastructure;
- Access to physical transmission media;
- Access to active network services at a wholesale level; and
- Retail services.

26. Lower levels of access provide greater flexibility for access seekers, for example, by gaining access to ducts, an access seeker can deploy their own cables, not being constrained by the nature of the cables currently deployed. Similarly, gaining direct access to cables can allow access seekers to deploy their own active electronics.

27. As we explain below, typically, regulators will want to bring the benefits of competition to as much of the value chain as possible, rather than rely on prescriptive retail price regulation.

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4 The regulatory framework which underlying access regulation can be traced back to the Access Directives.
2.3 Benefits of passive access remedies over active remedies

28. Regulators have a choice of where to intervene in the value chain to ensure the best outcome for consumers, taking account of the costs and benefits.

29. Access regulation which only requires the regulated company to provide active access products opens up a minimal part of the value chain to competition. For example, where corporate customers wish to buy a basic connectivity service, the CP may be effectively reselling the wholesale products. The ability of CPs to compete by innovating and differentiating their products is constrained because the product characteristics and costs are controlled by the SMP operator.

30. Access regulation based on passive remedies allows CPs to invest in their own active equipment and use their control of this active equipment to innovate and differentiate their services from those provided by the regulated company.

31. Active and passive access remedies are not mutually exclusive. Allowing for access at different points of the value chain can be complementary, for example Ofcom, in the local access markets, requires passive remedies such as LLU, as well as active remedies such as WLR. Such an approach allows
operators to adopt different business models between geographies and over time.

32. Ofcom has previously highlighted the benefits of infrastructure-based competition. For example, Ofcom noted that there were two key reasons why providers pursued physical access remedies for providing broadband services. It stated that a physical access remedy such as LLU:

“…offers more control over the services that they can offer. This allows greater product differentiation and increases the number of services available to consumers.

It provides control over a greater part of the value chain and exposes more of the underlying cost structure. This gives the provider a greater opportunity to introduce efficiency improvements and allows greater flexibility in tariffs.” [original emphasis]

33. These benefits manifested themselves in:

- the considerably improved consumer outcomes such as lower costs, improved quality, better price and product innovation;
- a lower regulatory burden once competition is established.

2.3.1 Competitively set prices

34. Under the SMP framework, price controls such as cost orientation conditions or charge controls can be applied to active services. However, the dynamic nature of BCM services and the information asymmetry between Ofcom and BT means that it may be difficult to effectively constrain Openreach’s profitability to a normal level.

35. For example, the prices of AISBO services have generally been above the reported level of FAC for these services. This is shown in Figure 3 which compares the returns on AISBO products with Ofcom’s benchmark return for Openreach.
36. A move to a passive access charges control may be more effective in ensuring that the overall level of prices is in line with costs for a number of reasons:

- Competition in the downstream markets should ensure that for these elements of the value chain margins reflect costs;
- Forecasting unit costs (view demand and cost forecasting) may be more straightforward for the relatively smaller set of passive products; and
- The scope for ‘gaming’ the price control may be more limited with a smaller set of simpler products.

2.3.2 Greater efficiency

37. Competition forces suppliers to examine their cost structure to ensure that they are producing at the most efficient level\(^5\). Even if competition is not possible across the whole value chain, passive access enables competition across a greater degree of the cost stack than is possible with active remedies. This can be seen in Figure 4 which illustrates the cost stack for Ethernet

\(^5\) While charge controls can attempt to incentive efficient operations by the regulated company, they are typically less powerful than competition in achieving efficiency gains.
Access Direct services. Depending on the service between 40% and 70% of the cost stack reflects the duct and fibre costs and costs associated with operating and maintaining duct and fibre. This means that if customers were offered wholesale passive access between 30% and 60%, the cost stack (including the costs of access cards and Ethernet electronics) would be contestable, and rivals could compete by delivering these elements more efficiently than BT.

**Figure 4. Breakdown of EAD product costs**

![Graph showing the breakdown of EAD product costs.](image)

Source: Frontier Analysis of BT RFS

38. An example of CPs innovating to deliver services more efficiently is the use of MSANs by LLU operators to offer lower cost voice and broadband packages over all-IP networks, compared to the separate voice (TDM) and broadband (ATM based) networks used by BT.

### 2.3.3 Improved quality

39. Quality is a key dimension of competition. There could be a number of aspects of quality which customers might value:

- Improved product characteristics;
- Lower propensity of lines to fault,
- Faster repair times; or

The benefits of passive access remedies
Improved levels of customer services.

40. Competition ensures that suppliers who offer a poor quality service are forced to exit the market as customers switch to providers offering better quality services. Absent the burden of having to compete for customers, firms are less incentivised to offer high quality products.

41. While charge controls can proxy (albeit poorly) competitive pressures on cost and prices, there is a risk that regulated operators will profit maximise by reducing quality below the competitive level. Allowing passive access will allow CPs to control provisioning and repair activity relating to active equipment, although CPs would still be reliant on BT for provisioning and repair of the underlying passive infrastructure.

**Figure 5. Openreach Provisioning Performance**

![Openreach Provisioning Performance Chart]

Source: Office of the Telecommunications Adjudicator

42. **Figure 5** shows the percentage of service orders successfully completed on or before the committed delivery date (the blue line) and the target percentage (the red line). This indicates that Openreach has not been able to meet SLA targets on the provision of Ethernet services. When considered alongside the high profitability shown in **Figure 3**, this suggests that Openreach’s poor performance is not due to an overly harsh price cap.
43. Similarly, Figure 6 illustrates how Openreach’s repair performance has been below target for large periods in the last year.

44. Under passive remedies, CPs are in control of a greater proportion of the value chain allowing them to:
   - diagnose and repair faults more readily;
   - invest in equipment which lowers the propensity of lines to fault;
   - compete on other dimensions of quality such as product characteristics or customer service.

45. The impact of passive remedies on the quality of products offered can be observed in the LLU market. In this market, ISPs competed with each other to provide broadband services. The competition enabled by physical access allowed competitors to leapfrog BT as LLU based ISPs invested in ADSL2+ technologies to offer their consumers much superior broadband speeds than the ADSL standard.

46. Ofcom for example noted that “LLU allows providers to use different technologies from BT, such as ADSL2+, which enables broadband services at much higher speeds than the first wave of ADSL based services. New alternative LLU operators such as Bulldog, Easynet and Be continued their roll-out of service offerings of up to 24Mbit/s.
broadband throughout the first half of 2006,” and that “some LLU operators, like Be with its up to 24Mbit/s core proposition, are using speed as a point of differentiation.”

47. Where only active products are offered then there is limited scope for competitors to compete on quality of service. This is because they rely on the incumbent’s service level, or because the incumbent’s wholesale products do not enable product differentiation at the retail level.

48. Furthermore, vertically integrated incumbents may have a strategic incentive not to offer wholesale products which enable downstream rivals to compete on quality.

49. The problem of lack of quality of service was a key justification for Ofcom promoting the passive LLU remedy. It noted that prior to its LLU remedies, despite consumer demand:

“(T)hose who rely on BT to provide such access have experienced twenty years of:

• slow product development;

• inferior quality wholesale products;

• poor transactional processes; and

• a general lack of transparency.

While individually each issue might seem immaterial, cumulatively they make the reality of competing against a vertically-integrated player an economically unattractive proposition.” [emphasis added]

2.3.4 Product and price innovation

50. Just as customers do not have homogeneous demand for telecoms services, so the products that are offered should not be homogeneous. Business customers’ demand will be particularly heterogeneous as it will depend on a multitude of factors reflecting their specific business strategies, customer base, and use of complementary products.

51. In competitive markets, competitors would enter the market or build market share by innovating and designing new products or product bundles which appeal to and target specific customer groups. Unmet customer demand for a new type of product would quickly be met. Firms offering uniform products would lose market share.

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6 Ofcom CMR 2006, section 3.2.3.
7 Ofcom CMR 2007, section 4.1.6.
52. By contrast, in markets supplied by a monopolist, there is less incentive for the monopolist to respond to consumer demand by investing and innovating to provide new products.

53. The innovation benefits of regulation enabled by competition were noted by Ofcom:

“Innovation in particular cannot be imposed on a market as a regulatory requirement. Services-based competition does encourage innovation in relation to branding, billing, and packaging of services, but much of the innovation that consumers value in telecoms stems from the ability to combine both network and service capabilities.”

54. There are a number of examples of potential innovations which could have brought benefits to consumers where Statement of Requirements (SoRs) were rejected as set out in Table 1. There are likely to be a large number of smaller potential innovations where CPs did not submit SoRs, as they believed that the possibility of a positive outcome was minimal.
Table 1. Potential Service Innovations in the BCM

<table>
<thead>
<tr>
<th>Service</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>TILLAP</td>
<td>The replacement service for WES155 and WES622, where £300k of systems development cost was cited as the barrier to progress, despite the hardware to be used already being in production for the WES2500 service, requiring a software selection step for new lower speeds requested</td>
</tr>
<tr>
<td>Ethernet NID access</td>
<td>Improved Ethernet Operations and Maintenance (OAM) capabilities based on more recent NTE devices, which follow global industry standards to allow interrogation of the devices via the traffic stream to report on errors, command test capabilities such as loopbacks, test patterns etc. In this case, there was no extra forecast volume by CPs (i.e. additional revenues), but CPs forecast that a large majority of the 80% of faults picked up each month by Openreach that are “Fault-Not-Found” would be dealt with by CPs, reducing the load on the Openreach fault desks and first-line repair teams, and hence increasing efficiency of the in-life service as well as improving the customer experience.</td>
</tr>
<tr>
<td>Synchronous Ethernet</td>
<td>New NTEs and line cards in the CP POP handover shelves, with software development need in the Openreach systems for extra alarms monitoring the synchronisation state. A complicated development, made worse by Openreach’s choice to only productise on their new EST way of working. This also has implications on the upgrade capability, since current circuits are outside of the EST</td>
</tr>
</tbody>
</table>

Source: Vodafone

55. As noted above, Openreach has reduced incentive to innovate, given its market power. However, the restriction of access to active services will also dampen the ability to innovate. The complexity of the network, service and process interfaces and the need to agree and standardise these interfaces for equivalence of inputs means that there will be a tendency to standardise on a small number of generic interfaces. However, to some degree the problem is structural to access regulation of active services.
56. Allowing access at a dark fibre level will mean using Openreach resources and processes to provide the necessary fibre strand or fibre pair, with the necessary Resilience options, and leaving the CPs free to install the devices needed for the service the customer requires will allow CPs. Openreach could also provide a Managed Install service, so CPs can take advantage of Openreach’s expertise to also fit the device or devices on their behalf.

57. There are existing processes that may form the basis of process for a passive fibre product:

- The process already in place to provide access to BT MDF sites for CPs for the purposes of providing LLU and VULA services; and
- The process for provision the underlying fibre required for existing AISBO services.

58. Such a regime would increase the ability of CPs to innovate by reducing Openreach’s ability to control which active services are provided over its network. As it is the electronics which evolve quickly over time, dark fibre access would provide much of the innovation benefits. In addition, as the dark fibre interfaces could be relatively stable over time, the ability for CPs to innovate through the electronics they attach to the dark fibre would not be hampered by the large regulatory overheads associated with the current Statement of Requirements regime. This would allow CPs to both better meet their customers’ demands but also to anticipate customer demands by introducing new capabilities even where there is no guaranteed demand in order to build competitive advantage.

59. The increase in innovation would also extend down the value chain as others whose businesses are dependent on connectivity, such as smaller service providers or end users could request custom services from CPs with a much greater probability of these requests being met.

2.3.5 Reducing regulatory intervention

60. Passive access means that regulation further downstream can be withdrawn over time. All forms of regulation incur a cost. These costs include the direct costs on the regulator and regulated firms on implementing regulations, but wider economic costs associated with unintended regulatory failures which result from incomplete information.

61. For example, as noted above, an effective dark fibre access regime could significantly reduce the need for CPs to submit Statement of Requirements, for BT to assess these and for Ofcom to intervene in case of disputes.

62. Indeed, one of the key justifications for implementing the LLU passive remedy was precisely to remove complex layers of regulation which did not
necessarily support enduring competition. Ofcom, for example, noted its rationale for LLU based competition was that:

“Past regulatory attempts to secure fair access at wholesale level to BT Group plc’s networks and facilities have also led to a large and growing range of detailed regulatory interventions, and at times regulatory micro-management of BT Group plc at different points in the value chain, which can set conflicting incentives both for BT Group plc and its competitors and encourage commoditised competition on the basis of regulatory arbitrage.”

63. Following the introduction of LLU, its use took off rapidly as competition took hold. Ofcom noted that “it took six years to achieve take-up of the first million LLU lines; take-up of the second million took only 6 months.” This meant that consumers were offered a range of providers. It is now taken for granted that in the consumer broadband market almost all premises are served by a number of different infrastructure providers. The 2013 WBA consultation found that 90% of premises are in areas where there are three or more Principle Operators present or forecast to be present. Ofcom noted in 2007 the impact that “the significant expansion of choice and, consequently, take up have been attributable in large part to the changes in the wholesale pricing regime and the implementation of the Undertakings entered into by BT.”

64. As competition took hold, Ofcom gradually was able to withdraw regulation at lower parts of the value chain, for example withdrawal of charge controls on Wholesale Broadband Access in most of the UK.

2.4 Conclusion

65. The benefits of infrastructure based competition over service based competition are well understood. Indeed they were a key justification for Ofcom proposing a physical access remedy (LLU) for broadband markets. The impact of the LLU remedy was strong and immediate. Infrastructure based competition led to a step change in the quality, costs, innovation of broadband products offered which continues to endure.

66. The potential gains from increased innovation in the Business Connectivity Market are likely to be significant, given the diverse range of users and

8 TSR 2 Foreword.
10 Principle operators are defined as BT, Sky, TalkTalk and Virgin Media. WBA consultation paragraph 1.18, and 4.61.
applications which depend on products from this market. The current active access regime results in large barriers to the introduction of innovative services which, coupled with Openreach’s reduced incentives to innovate, is likely to lead to customers not getting the same range of services that they could expect in a competitive market. A regime of dark fibre access overcome this barrier to innovation; bring benefits to users in downstream markets.

67. By introducing competition over a larger part of the value chain, dark fibre access would also tend to lead to lower costs, passed through to end users in the form of lower prices, and a quality of service better reflecting a competitive market.

68. Introducing passive access could also reduce some of the regulatory overhead associated with intervention in complex active markets, with the regulatory focus being concentrated on the much simple pricing, processes and interfaces required for an effective dark fibre remedy.
3 Passive access issues

69. Mandating passive access remedies would have the intention of enabling greater competition in the BCM and in downstream markets, by preventing BT from leveraging market power associated with control of infrastructure. However, this reduction in BT’s market power in these downstream markets could have some unintended consequences which need to be considered before deciding whether to implement passive remedies.\(^\text{12}\)

70. In the 2013 BCMR statement, Ofcom raised a number of potential issues:

“imposing passive remedies in leased lines markets could carry significant risks of worse outcomes than continuing to impose active remedies alone, including:

- adding significantly to the cost of competition in leased lines markets;
- encouraging inefficient entry;
- raising end-user prices of services other than high-bandwidth products and/or of services other than those provided in areas containing dense clusters of businesses (such as urban centres);
- rebalancing the charges paid by the end-users of leased lines services – so that some end-users would pay less while potentially many others would pay more – without necessarily achieving greater efficiency; and
- undermining investments that have already been made in alternative infrastructure.”\(^\text{13}\)

71. The degree to which these are issues depends critically on the economic regulation framework determined for passive access, in particular how passive access would be priced.

72. In this section we address these issues are following

- how prices for passive access could be set based on the underlying costs of duct and fibre access and how these costs are currently recovered;
- the impact of any rebalancing between high and lower bandwidth services;
- the potential impact on competition in different geographic areas; and

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\(^{12}\) Although it should be noted that some form of infrastructure access will be mandated as set out in As set out in Press Release: New measures to cut broadband costs agreed by the Council and the Parliament - Council of the European Union Brussels, 28 February 2014 7119/14 (OR. en) PRESSE 108.’

\(^{13}\) BCMR 2013 Statement 2013.
the impact on investment incentives,

3.1 **Price regulation of duct and fibre access**

73. One of the key elements of access regulation is price regulation, to ensure that prices are efficiently set. This section sets out a potential framework for price regulation of passive access products, building on the existing regulatory cost approach used to regulate the prices of active products. We conclude that it is possible to cost cable access products in a way consistent with the existing costing of active products, but this is more challenging for duct access.

3.1.1 **Underlying costs**

74. The cost of basic transmission and access services such as Ethernet services is made up of a cost stack consisting of:

- The cost of duct used to house the cables used for the service;
- The cost of the cables used for transmission;
- The costs of the electronics used to provide the transmission services over the network;
- Other network costs such as the cost of network buildings housing the electronics and operations and maintenance of network equipment and infrastructure; and
- A range of support costs, common costs and overheads.

75. The relative proportions of each type of cost are shown in Figure 7 below.
Figure 7. Illustrative cost stack

76. A significant proportion of the costs of BT’s network are fixed and common with respect to the volume of services, i.e. these costs are required to deliver services but do not vary with respect to the volume of demand.

77. Most of the costs of core fibre are incremental, i.e. increase and decrease in the long run depending on the level of demand, while the fixed and common cost component of duct is relatively high. This is illustrated in the cost volume relationships determined by BT of duct and core fibre\textsuperscript{14}.

\textsuperscript{14} The costs of the fibre access network are assumed to be largely fixed.
3.1.2 Current regulatory allocation of passive (duct and fibre) costs

78. The current charge controls applied to active access products in the BCM use data from BT’s Regulatory Financial Statements as an input. In this section we set out the cost allocation treatment of duct and fibre in this cost allocation.

Duct costs

79. The allocation of duct costs broadly follows the following methodology:

- The total cost of the duct network is allocated between core, backhaul and access duct based on a 1996 survey of the usages of the duct network: the Absolute Duct Study (ADS). For routes common to different parts of the network (i.e. access and core) costs are allocated on the basis of
  - Access duct is allocated between copper access cable, GEA fibre and other access fibre (i.e. used for BCMR services) based upon the ADS and more recent information on investment;
  - Backhaul duct is allocated to backhaul fibre;
  - Core duct is allocated to core fibre.
Fibre costs

80. Fibre costs are allocated as follows:

- Fibre costs are allocated to network components on the basis of the Core Transmission Circuit costing System (CTCS) which allocates on the basis of the number of bearers (effectively a single transmission link)\(^\text{15}\) and distance;

- Fibre network components are allocated to services on the basis of usage factors. For Ethernet services the factors appear to be uniform, i.e., the cost allocated per service is equal for each service.

81. The allocation of fibre costs closely reflects the incremental costs of fibre. The treatment of duct costs which are allocated reflecting the incremental costs of fibre, rather than the incremental duct costs of the service.

Resulting passive cost stack

82. The result of the allocation of duct to fibre service and fibre services on a largely incremental basis is that passive assets are allocated to active services broadly on a LRIC+EPMU basis where:

- The LRIC component reflects the incremental costs of fibre cable; and

- The EPMU component reflecting the costs of duct, which are largely fixed and common and the common cost element of fibre cable.

83. This difference in approach for duct and fibre assets, with the cost of the duct network being treated as a fixed and common cost, has implications for the potential price regulation of passive products, as described below.

3.1.3 Implications for the pricing of passive access

Passive fibre access

84. Prices for fibre based access (which would incorporate the costs of the underlying duct and other indirect costs) could be set to be consistent with the FAC component costs used to set the charge controls for active services. This is analogous to the relationship between passive services (i.e. LLU) and active services (i.e. WLR) in the Wholesale Local Access market.

\(^{15}\) For technologies such as SDH, where a single bearer may carry multiple services, there is a further allocation stage based on the number of circuits.
**Passive duct access**

85. The cost of the duct network is broadly treated as a fixed and common cost within different parts of the network (the division into access, backhaul and core reflects causality to a degree). This raises conceptual difficulties when setting duct prices as the duct cost recovered from a given service is not related to the duct actually used to deliver the service. For example, all similar services recover the same quantum of the cost of the duct network whether delivered over ducts in dense urban areas shared with many other services or in a dedicated duct in a rural area.

86. In order to be consistent with the current regulatory costing regime, the cost of duct access would have to reflect the number of services using the duct rather than the underling costs of the duct\(^{16}\). This would undoubtedly be complex to implement and would be potentially subject to gaming. The current PIA offer in the WLA includes some differentiation in duct access pricing depending on the number of duct bores on the route, but it is unclear whether this reflects these considerations\(^{17}\).

87. The alternative, to set prices based on the costs of the duct, would be inconsistent with the current downstream pricing of active products. The potential implications of this are explored below.

### 3.2 Price discrimination by bandwidth

88. The current charge controls applied to active products allow a degree of flexibility in how BT recovers costs. BT has used this flexibility to recover proportionally more costs from higher bandwidth services than lower bandwidth services. This section examines the degree to which BT’s ability to maintain the price discrimination would be diminished under a passive access regime and whether a reduction in BT’s ability to discriminate will lead to a reduction in efficiency. We find that it is likely that passive access will reduce BT’s ability to price discriminate across active products but that it is unclear whether this will, in itself, lead to a significant reduction in efficiency.

#### 3.2.1 BT’s price discrimination

89. BT’s regulatory cost accounting system, and hence FAC costs, is based on supply side factors:

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16 In some way akin to the Efficient Component Pricing Rule, where prices for components reflects downstream revenues foregone rather than underlying costs.

17 The highly restricted uses allowed of the PIA service presumably in part reflect this issue.
“Adherence to the principle of causality is the fundamental feature of the attribution methods that we apply.”

90. Allocation should not explicitly or implicitly take into account demand side factors such as customers’ willingness to pay for end services.

91. The charge controls imposed as remedies following the previous market review allow BT some flexibility in how it recovers (forecast) costs for baskets of services under an overall price cap. As such BT can set relative prices of individual services in a way which does not reflect the relative FAC for these services. At the end of the charge control period, there is an expectation that overall revenues for the controlled services would be equal to the aggregate FAC of services i.e. any prices above FAC would need to be balanced by prices below FAC.

92. For example, within the price cap applied to Ethernet Access Direct Services BT has flexibility to set individual prices and BT has used this flexibility to set a ‘tariff gradient’ which does not reflect differences in FAC costs.

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18 BT Primary Accounting Documents 31 July 2013 page 15
3.2.2 Passive access restricts the ability to discriminate

93. Ignoring the fact that overall prices (revenues) are above cost, the price cap allows BT to disproportionately recover fixed and common costs from a subset of higher bandwidth services.

94. Passive access would be utilised to provide services which will compete with BT’s services such as the EAD services above. It is reasonable to assume passive access services would be price controlled in a way which reflects the FAC cost allocation underlying BT’s accounts.

95. This means that a CP which was equally efficient as BT in the provision of downstream activities would be able to use passive access services to replicate BT’s fully allocated cost structure, i.e. they would pay FAC charges for the passive elements of the cost stack and would self-provide the other elements of the cost stack at a cost equal to BT’s FAC costs.

96. Where BT provides some services at a price above FAC (for example under a charge control), this would produce an regulatory arbitrage opportunity, as the CP would be able to deliver a similar capability using passive access at FAC while still making a reasonable return. Conversely the where BT’s prices were below FAC, the incremental cost faced by the CP using passive access would be higher than BT’s prices and even an equally efficient CP would not
be able to offer the capability at BT’s price. In this case the CP would choose to continue to use the BT wholesale service.

Figure 10. Regulatory arbitrage opportunity with price discrimination

97. Such an outcome, where the use of passive access was driven by regulatory arbitrage opportunities rather than efficiency would not achieve Ofcom’s objectives to ensure efficient competition.

98. If BT tried to maintain active wholesale prices significantly above FAC demand for these services would be substituted by CPs delivering services using FAC. As a result BT would overall not fully recover common costs:

- Where active wholesale prices were set above FAC, CPs would use passive services where BT’s cost recovery would be at the FAC level;
- Where active services were set below FAC, CPs would use these active services and hence BT would recover below FAC.

99. Given the flexibility BT has in the charge control, BT would be likely to raise prices for below FAC services up towards FAC and those above FAC down towards FAC (either within a charge control or if prices were de-regulated).

100. This rebalancing of tariffs would:

- Allow BT to fully recover costs by recovering at a FAC level for all services, both passive and access;
Remove the regulatory arbitrage opportunity that would existing between active products with prices set above FAC and passive products with prices set at FAC.

101. **Figure 9** shows however that in practice all prices were set above FAC in 2013. As such in such a situation, all prices would fall, bringing benefits to all consumers. In previous situations where regulatory intervention required BT to rebalance prices, for example the real increase in line rental prices following liberalisation, competitive pressures ensured that overall prices fall sharply.

### 3.2.3 Would rebalancing lead to efficiency losses?

102. Under certain conditions, flexibility to price discriminate under a price cap can result in an allocatively efficient outcome, in that demand will be maximised subject to the constraint that overall revenues equal costs (i.e. Ramsey prices). This is because under a charge control, a hypothetical monopoly provider which provides no other services will have the incentive to maximise the total contribution to fixed and common costs by setting prices which reflect users’ willingness to pay.

103. While such incentives apply to some extent to BT, there are a number of other factors which will affect the tariff gradients applied by BT:

1. BT provides other services which are partial substitutes for the charge controlled services;
2. BT faces competition from competing infrastructure providers for some services;
3. The charge controlled services are used by competitors to BT in downstream retail markets; and
4. The charge control has some potential to be gamed to increase revenues.

104. The impact of these effects is explored below.

**Other non-charge controlled services are partial substitutes**

105. When setting prices for the charge controlled services, BT should also take into account cross-elasticities and incremental and common costs. For example the pricing of 1 Gbit/s EAD services will affect demand for higher capacity services such as OSA, the prices of which are not included in the price cap. As a result, BT may have an incentive to increase prices for the 1 Gbit/s service in order to increase revenues for the OSA services by reducing the differential between the 1 1 Gbit/s EAD service and the higher bandwidth OSA services (i.e. ‘pushing’ demand onto the unregulated OSA service)

**Passive access issues**
106. Similarly, BT may have an incentive to reduce the price of low bandwidth services in order to prevent substitution by much lower priced asymmetric broadband services (i.e. GEA or ADSL based services), i.e. pulling demand from these services.

**BT faces competition from competing infrastructure based providers**

107. BT faces some competition from infrastructure providers for the regulated services. This means that BT’s revenues will not only be affected by total demand for the regulated services but also by market share. As such, the super-elasticity faced by BT, on a service by service basis, is likely to differ from the whole market super-elasticity and hence BT’s revenue maximising level of prices will differ from the level of prices which will maximise total welfare.

**The regulated services are used as inputs for downstream services provided by BT and CPs**

108. Given that the regulated access services are used to provide downstream services provided by both Openreach and by CPs, BT’s incentives will take account of margins earned on downstream businesses as well as the margins on the regulated services themselves. This will distort BT’s incentives. For example, services provided to CPs will result in no (direct) downstream margins, and may reduce BT’s margins in other services (for example increases in usage by CP LLU providers may reduce margins in WLR and WBA services). This would lead to BT increase common cost recovery from services used by CP providers.

**Gaming of the charge control**

109. Charge controls are susceptible to gaming, particularly in dynamic markets where demand for individual services is changing rapidly. The base weighted nature of the charge control means the BT can potentially increase revenues within a cap by reducing the price of services where demand is falling by more than services where demand is increasing. This could lead BT to set prices in such a way as to allow a greater effective price increase than assumed when setting the charge control. Any observed discrimination with price control baskets could be the result of such gaming rather than a result of BT adopting a demand maximising tariff gradient.

**Conclusion**

110. While BT’s prices will reflect customers’ willingness to pay to a degree there is little reason to believe that the outturn prices are efficient from an allocative efficiency perspective. BT’s (legitimate) incentives are to profit maximising across its business and this can lead to outcomes which reduce

Passive access issues
overall demand for services and which hinder the development of competitive downstream markets. Indeed the fact that currently report EAD rental prices are significantly above FAC overall shows that these prices were not efficient in a Ramsey sense.

111. Any reduction in allocative efficiency which may result from the introduction of passive remedies should be balanced against the benefits for competition and hence dynamic efficiency. In particular, the potential for BT to use price discrimination within a price cap to discriminate against CPs in downstream markets, increasing prices for necessary inputs they use to compete against BT’s businesses, suggests that there could be significant efficiency losses due to the reduction in competitive pressure and hence dynamic efficiency losses.

3.3 Geographically averaged prices

112. Regulated access prices and downstream retail prices are generally set on a uniform national basis\(^\text{19}\), i.e. customers pay the same price for a given service independently of location. In this section we first explore the impact of passive access on the ability to maintain this geographic averaging and then discuss the potential efficiency impact. We conclude that geographic averaging is likely to bring benefits and that applying a remedy based on fibre access will allow geographically averaged prices to be maintained,

3.3.1 Impact of passive access on geographically averaged prices

Passive cable access

113. Cable access prices set to reflect the component costs used to set the active services (as described above) would be by definition geographically averaged and consistent with the downstream prices and hence would not affect BT’s ability to maintain geographically averaged prices. This is analogous with the ability of BT to maintain geographically averaged WLR prices in the consumer market due to the geographically averaged nature of LLU services.

Duct access

114. BT’s geographically averaged active prices are implicitly based on an average (across the country) utilisation of duct. As the active prices do not reflect the underlying usage of duct by individual customers or services, geographically averaged duct pricing on a simple per metre basis averaged across the

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\(^\text{19}\) There are some exceptions such as leased line prices in Central London.

Passive access issues
country could produce a regulatory arbitrage opportunity with respect to active products:

- A competitor equally as efficient as BT would use duct access on routes where the CP could achieve a higher utilisation of the duct (in terms of customers) than BT on average20; and

- On ‘thin’ routes where the CP’s duct utilisation would be relatively low, the CP would not be able to match BT’s active prices through duct access and would rely on the active services.

115. This regulatory arbitrage by CPs could make BT’s geographic averaging across both active and duct access unsustainable resulting in a rebalancing of prices where prices would fall in areas of high duct utilisation and increase in areas of low duct utilisation.

3.3.2 Efficiency of geographically averaged prices

116. ‘Geographically averaged’ end user prices are likely to be reasonably efficient21 subject to two conditions:

1. The incremental cost (i.e. excluding fixed and common costs) for all customers is similar independent of location; and

2. Customers’ willingness to pay (price elasticity) is not systematically dependent on location.

117. While it is reasonable to assume that there is some variation in terms of both incremental cost and willingness to pay across the country but the degree to which such variation could be captured in objective pricing rules may be limited. In addition uniform price are also likely to be productively efficient to an extent as a single price will lower associated costs such as billing and advertising.

118. While the average cost of the duct network used to serve customers will differ significant depending on a customer’s location, for example it will be much lower in areas with a higher density of customers due to economies of density, duct is largely a fixed cost. Costs which are incremental to customers such as cable and electronics costs are to a degree independent of location, although there will be a distance22-related element to cable costs (which is reflect in the prices for some services).

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20 Even if the CPs utilization was lower than BT’s utilisation on the particular route.
21 Uniform prices
22 From the customer premises to the point of presence
119. There is little reason to believe customers’ willingness to pay will vary systematically with location.

120. As such it is reasonable to assume that current geographically averaged tariffs are efficient.

3.3.3 Conclusion

121. A passive cable access regime based on geographically averaged cable costs should allow geographically averaged active prices to be maintained.

122. It would not be possible to set simple geographically averaged duct prices and maintain geographic averaging of end user prices. As geographic averaging at a customer level appears to be broadly efficient this suggest that the most appropriate solution would be to vary pricing for duct access to reflect the number of customers that could be served by the duct. \(^{23}\) This would undoubtedly be complex to regulate.

123. A passive duct access regime consistent with current geographically averaged

3.4 Investment incentives

124. Ofcom makes two arguments on the potential impact of passive access on investment incentives:

- That investments based on the current regulatory regime may be stranded by a change to a different regime; and
- The new investments following a change in regime may be ‘inefficient’ in that investment may be concentrated in niche markets; and
- Passive access based on dark fibre access priced consistently with the current active service would not appear to fundamentally alter cost recovery in either upstream infrastructure markets or downstream service markets. While there could be a shift in demand from BT’s active products to products delivered using passive access a combination of the likely slow rate of migration and the relatively short economic assets lives of the underlying electronics means that the scope for stranded assets would be limited.

125. To the extent that passive access pricing, for example dark fibre, was consistent with the current active service costing, there would be little incentive to ‘cherry pick’ certain niche markets on the basis of regulatory

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\(^{23}\) This is analogous to the Efficient Component Price Rule, where access prices are set on the basis of retail revenues forgone if a given component is used for access.
arbitrage. CPs would have incentives to innovate to customise services to better reflect the needs of niche markets, but we conclude this would not be at the expense of the broader market.
4 Fibre Access may bring significant net benefits

126. There is growing recognition that there are significant potential gains to the wider economy from better connectivity. A well-functioning business connectivity market which meets the needs of the full range of customer dependent on these services is essential to realise these gains.

127. Introducing dark fibre access would bring significant benefits by opening up a larger part of the value chain to competition. A key benefit would be an increase in the ability of CPs to innovate, as a combination of Openreach’s lack of incentives to develop innovative services and the cumbersome process for requesting new capabilities means that there is likely to be significant un-met need. Other benefits could include higher overall quality of service, pricing which better reflects an efficient level of costs and improvements in quality of service.

128. The price of passive fibre access could be regulated using the existing costing framework underlying the price regulation of active services. This consistency between passive and active pricing would ensure that competition at the active level would be driven by efficiency rather than regulatory arbitrage. There would also be no fundamental change in the ability of BT or other providers of passive infrastructure to make a reasonable return on existing investments in duct and fibre. While the introduction of effective passive access would limit BT’s ability to price discriminate in downstream markets, any losses in allocative efficiency resulting from consequent rebalancing of tariffs would be offset by the dynamic efficiency gains from increased competition.
Annexe 1: LLU: 2005 Telecoms Strategic Review

129. It is probably not an exaggeration to say that the TSR was the single most important piece of UK telecoms policy in the last twenty years. In the TSR, Ofcom recognised long standing competition problems in the [local access phone and broadband markets]. It explicitly rejected regulatory tinkering at different layers of the value chain, in favour of a bold and assertive regulatory approach. The TSR mandated a passive access remedy to enable infrastructure based competition. The policy had immediate and profound implications for the UK telecoms sector which live on today.

130. There are parallels between the regulation of fixed telecoms services in 2005 and business connectivity in 2014. It is therefore appropriate to reflect on whether Ofcom’s approach in the TSR offers lessons on the how business connectivity could be regulated.

131. The rest of the section is set out as follows.

- We first summarise the market and regulatory background to the TSR;
- We then summarise the key features of the TSR proposals;
- We then consider the impact that the TSR has had;
- Finally we conclude and consider implications for regulation of business connectivity markets.

The market and regulatory background to the TSR

132. In this section we consider the background to the TSR. Ofcom’s review of the telecoms market which began in 2003 revealed a number of features of the telecommunications market.

133. It had been twenty years since BT had been privatised, but for large parts of the country BT was effectively a monopoly provider of the infrastructure required to provide telecommunications services. Regulation had focused on either encouraging full end-to-end competition, or had led to unsustainable service based competition. This regulatory background had not enabled entry competitors to BT except insofar as cable operators were able to supply telecommunications services. The lack of infrastructure based competition, in turn, led to poor outcomes for consumers.
The market was characterised by rapid change

134. At the time of the TSR the industry was undergoing rapid change caused by technological advances. These included:

- the migration from PSTN network to IP based Next Generation Networks (NGN) for voice and data services;
- new and innovative services (such as VoIP) enabled by a greater diffusion of faster, more powerful devices connected to telecoms networks;
- greater demand for access bandwidth.

135. While the existing market structure was able to provide universal provision of a uniform (voice) product it was not well equipped to meet the challenges offered by these structural changes the market.

The market was dominated by BT

136. In the supply of broadband Ofcom noted that it was almost exclusively supplied by either cable TV networks or BT. It also noted that a key challenge for it was that there was little appetite to compete with BT at the local access level:

“Despite nearly 20 years of regulatory activity intended to promote competition, the detailed market reviews conducted by Oftel (Office of Telecommunications) last year concluded that BT remains in a position of Significant Market Power (SMP) in many of the fixed telecoms markets examined.”

137. According to Ofcom the lack of competition was a result of enduring economic bottlenecks. The high sunk costs and economies of scale of fixed access networks meant that infrastructure based market entry in the medium term was unlikely.

The existing regulatory regime did not promote infrastructure based entry

138. Ofcom described the regulatory framework that applied prior to the TSR as “Service Competition”. Service based competition allowed operators to exploit arbitrage competition using wholesale products such as Carrier Pre Selection (CPS). These policies led to market entry with 4.2m lines using

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24 TSR 2 page 5
25 TSR 1 page 2.
26 TSR 1 Annex G paragraph G18 -
CPS by September 2004\textsuperscript{27}. Likewise in August 2002 Oftel required BT to introduce Wholesale Line Rental.

139. However, Ofcom noted that these policies would not lead to “sustainable” entry. This was for two reasons. First, the profitability of service level entry would gradually be eroded over time as arbitrage opportunities were competed away\textsuperscript{28}. Second Ofcom noted that its regulatory approach led to multiple levels of regulation which were not necessary mutually supporting. It stated for example that:

“Past regulatory attempts to secure fair access at wholesale level to BT Group plc’s networks and facilities have also led to a large and growing range of detailed regulatory interventions, and at times regulatory micro-management of BT Group plc at different points in the value chain, which can set conflicting incentives both for BT Group plc and its competitors and encourage commoditised competition on the basis of regulatory arbitrage.”\textsuperscript{29}

140. In order to compete, entrants were reliant on BT wholesale services. In response to regulatory pressure BT began unbundling local loops in January 2001. However, Ofcom noted that by January 2004 only 8,919 loops had been unbundled. This is illustrated in Figure \textbf{11} below, which shows that the UK had a much lower level of LLU than France Germany, Italy or the Netherlands.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|}
\hline
\textbf{Annexe 1: LLU: 2005 Telecoms Strategic Review} & \textsuperscript{27} & TSR 1 paragraph 1.8. \\
\textsuperscript{28} & TSR 2 paragraph 4.98. \\
\textsuperscript{29} & TSR 2 Foreword. \\
\hline
\end{tabular}
\end{table}
Figure 11. Local loop unbundling in Europe 2004

Source: ECTA

Source Ofcom CMR 2004 Section 4 Figure 3

141. A significant factor in the slow up take of LLU was the lack of fit for purpose LLU product. In this context, Ofcom noted that:

“[T] hose who rely on BT to provide such access have experienced twenty years of:

• slow product development;
• inferior quality wholesale products;
• poor transactional processes; and
• a general lack of transparency.

While individually each issue might seem immaterial, cumulatively they make the reality of competing against a vertically-integrated player an economically unattractive proposition.” [emphasis added]

142. Ofcom acknowledged “that the problem of equality of access has proved to be the most intractable problem of telecoms regulation to date.”

Market outcomes were poor

143. The lack of meaningful competition for broadband meant that consumer outcomes were poor. When Ofcom conducted the TSR it noted that the industry was on the cusp of technological change as consumers and business switched from analogue narrowband services to broadband services. However, the UK lagged comparable countries in take up of broadband. In December 2003, when it began its review it had the lowest per capita broadband penetration of France, Germany, US, Japan, Sweden and South Korea.
Lack of choice

144. Ofcom considered that a well-functioning telecoms market would mean that consumers had a choice of suppliers. In this context, choice would mean that:

- There were different solutions for increasingly diverse customers;
- High levels of innovation. Ofcom did not specify the specific types of innovation that might be enabled by competition;
- Simplified purchasing and product bundling. According to Ofcom this was particularly important to SMEs where 82% of SME’s cited bundling as an important attribute when selecting supplier;\(^\text{30}\);  
- The ability to choose from a range of services and suppliers. This was particularly important for businesses where “the availability of high-quality, keenly priced data services from a range of suppliers was seen as a critical issue.”\(^\text{31}\).

Lack of innovation

145. Ofcom’s assessment in the TSR was that:

“For the majority of consumers, issues around the availability of innovative new products such as broadband are at least as important now as the issue of call prices. This confirms Ofcom’s sense that, while competitive pricing will remain a key measure

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\(^{30}\) TSR 2 paragraph 4.57.  
\(^{31}\) TSR 2 3.12
of success, rapid provision of new services is increasingly important. There is an equally strong interest in the benefits of product innovation, particularly among business users but also among residential consumers who now expect much greater functionality and flexibility from the products they purchase.”

146. Ofcom concluded that:

“...the choice, diversity, and innovation required by consumers in today’s much more diverse and fast-moving market could not be achieved in this way. Innovation in particular cannot be imposed on a market as a regulatory requirement. Services-based competition does encourage innovation in relation to branding, billing, and packaging of services, but much of the innovation that consumers value in telecoms stems from the ability to combine both network and service capabilities.”

Implementation of TSR

147. The 2005 TSR summarised the case for requiring that BT provided access to the local access network on an infrastructure level:

“Our market research and consultation suggested that businesses and consumers want much more than basic, reliable telecoms services at low prices: they also want choice, and rapid innovation and introduction of new services. Our assessment was that the most effective way of delivering this is through competition at the deepest level of infrastructure where competition will be effective and sustainable. We also showed that the competition that had delivered benefits to consumers to date might not be sustainable going forwards, so maintaining the status quo in terms of our regulation was not an option.”

148. This section summarises the regulatory framework that Ofcom implemented to meet its objectives of promoting choice, innovation and competition at the deepest level possible.

Framework

149. Ofcom adopted the principle that regulation should promote competition between competing infrastructures as deep in the network as such competition was likely to be effective and sustainable. As regulation enabled entry “deeper” in the network, so regulation could gradually be withdrawn at shallower levels of the network.

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32 TSR statement 3.11
33 Ibid.
34 Telecoms Strategic Review Final Statement 2005 Para 1.3
150. Ofcom proposed seven principles for telecoms regulation. They are that Ofcom should:35

“1. promote competition at the deepest levels of infrastructure where it will be effective and sustainable;
2. focus regulation to deliver equality of access beyond those levels;
3. as soon as competitive conditions allow, withdraw from regulation at other levels;
4. promote a favourable climate for efficient and timely investment and stimulate innovation, in particular by ensuring a consistent and transparent regulatory approach;
5. accommodate varying regulatory solutions for different products and where appropriate, different geographies;
6. create scope for market entry that could, over time, remove economic bottlenecks; and
7. in the wider communications value chain, unless there are enduring bottlenecks, adopt light-touch economic regulation based on competition law and the promotion of interoperability.”

Undertakings – equality of access

151. Equality of access was achieved by functional separation which were implemented via undertakings made by BT in lieu of a Enterprise Act 2002 market investigation reference. The undertakings had a number of key features. These included:

- **Equality of inputs.** BT was required to offer the same products, process, prices for key access / backhaul products including LLU, WLR, IPSTREAM.

- **Effective operational separation.** The new entity (Openreach) included 30,000 BT staff and nearly all its access infrastructure and facilities, including the copper local loop, local exchanges, and associated ducts and other civil infrastructure.

- **A suite of the access products** on which wholesale customers rely. These included: all forms of Wholesale Line Rental (WLR); local loop unbundling (LLU) products incorporating both full and shared; fibre access products including Wholesale Ethernet Service (WES) and Partial Private Circuit access products.

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35 TRS2 para 5.3.
152. Ofcom recognised the benefits of enabling entry higher up the value chain to encourage efficient investment. For example it stated that “solving the problem of lack of equality of access to bottlenecks holds the key to further relaxation of regulation in the sector. If equality of access is achieved at the wholesale level where BT holds SMP, and if effective competition is achieved as a result, it could be appropriate for Ofcom to adopt a more light-touch approach and withdraw from regulation in many other areas of the market.”[TSR 6.4]"

Pricing issues

153. At the time of the TSR, BT committed to reducing the price of LLU from £105 to £80 per year. Subsequent to the TSR, Ofcom set charge controls for LLU in 2005, 2009, 2012. Prices were set based on the costs of providing the services.

Relationship with active wholesale access services

154. Ofcom did not consider that passive remedies such as LLU were incompatible with active remedies such as WLR and WBA. Active remedies such as WLR and WBA continued to be charge controlled and Ofcom continued to require that these services remained available.

155. Ofcom did however give careful consideration of the relativities between the prices for MPF and WLR + SMPF the equivalent active remedy as Ofcom was concerned to avoid inefficient choices of passive or active wholesale inputs.

156. Following the introduction of the LLU and WLR, Ofcom began the process of deregulating at lower levels of the value chain (such as retail residential call and access prices).

Impact of TSR

157. The impact of the TSR was immediate and strong. Ofcom, for example, noted that “the ability of Communications Providers to compete at the infrastructure level has been a key driver of the nature and extent of competition. LLU has given

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36 Local loop unbundling: setting the fully unbundled rental charge ceiling and minor amendment to SMP conditions
operators the flexibility to offer differentiated services to their customers, allowing true diversity in service offerings.”  

158. In this section we consider the impact of the TSR across a number of dimensions:

- Take up of LLU;
- Choice;
- Innovation;
- Service quality;
- Pricing and penetration.

**Take up of LLU**

159. The undertakings led to the rapid take up of LLU based products. Ofcom noted that “it took six years to achieve take-up of the first million LLU lines; take-up of the second million took only 6 months.”

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40 A New Pricing Framework for Openreach. Paragraph 3.3.
Figure 13. Take up of bitstream, CPS, WLR and LLU

Figure 2.1. Take-up of bitstream, carrier pre-selection, wholesale line re-loop unbundling products

Source: Ofcom

Impact of the Telecoms Strategic Review Evaluation Statement

Figure 2.1.

160. Ofcom noted that there were two key reasons why providers pursued an LLU strategy for providing broadband services.

“It offers more control over the services that they can offer. This allows greater product differentiation and increases the number of services available to consumers.

It provides control over a greater part of the value chain and exposes more of the underlying cost structure. This gives the provider a greater opportunity to introduce efficiency improvements and allows greater flexibility in tariffs.” [original emphasis]

161. These benefits manifested themselves in the considerably improved consumer outcomes as outlined below.

Choice

162. Ofcom noted in 2007 the impact that “the significant expansion of choice and, consequently, take up have been attributable in large part to the changes in the wholesale pricing regime and the implementation of the Undertakings entered into by BT.” 41. It is now taken for granted that almost all premises are served by a number of

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different infrastructure providers. The 2013 WBA consultation found that 90% of premises are in areas where there are three or more Principle Operators present or forecast to be present.\(^{42}\)

**Innovation**

163. There have been a number of technical innovations as a result of greater competition. Not all of these could be precisely predicted by Ofcom at the time of the TSR, nonetheless Ofcom had confidence that enabling a competitive market place where suppliers competed with each other for custom, that they would compete not only on price, but on quality and characteristics.

**Bundled offers**

164. Since the TSR there has been significant growth of service bundles combining fixed line, broadband, television and, in some case, mobile services, offering significant benefits to consumers according to Ofcom\(^{43}\). Ofcom stated that “LLU has become a major facilitator of product bundling in the UK, as it allows providers who operate in other communications sectors to enter the fixed telephony and broadband markets without the need for expensive access network investment.”\(^{44}\) These included TTG’s “Free Broadband” package bundle which was enabled by LLU products.

**Network upgrades such as ADSL 2+.**

165. As ISPs competed with each other to provide broadband services they invested in ADSL2+ technologies. ADSL2+ enabled ISPs to offer their consumers much superior broadband speeds than the ADSL standard. Ofcom for example noted that “LLU allows providers to use different technologies from BT, such as ADSL2+, which enables broadband services at much higher speeds than the first wave of ADSL-based services. New alternative LLU operators such as Bulldog, Easynet and Be continued their roll-out of service offerings of up to 24Mbit/s broadband throughout the first half of 2006,”\(^{45}\) and that “some LLU operators, like Be with its up to 24Mbit/s core proposition, are using speed as a point of differentiation.”\(^{46}\)

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\(^{42}\) Principle operators are defined as BT, Sky, TalkTalk and Virgin Media. WBA consultation paragraph 1.18, and 4.61.


\(^{45}\) Ofcom CMR 2006, section 3.2.3.

\(^{46}\) Ofcom CMR 2007, section 4.1.6.
**IPTV**

166. IPTV is now a commonplace product with different TV platforms (BT Vision and TTG’s You View, as well as Sky TV) using it to provide on-demand TV services via the local loop.

**Service quality**

167. Increased wholesale access competition has supported substantial changes at the retail level. Headline connection speeds continue to increase. Average residential fixed broadband headline speeds increased from 0.6 Mbit/s in 2004 to 9.4 Mbit/s in 2009.

**Figure 14. Average non-corporate fixed broadband connection headline speeds**

![Graph showing average fixed broadband connection speeds from 2004 to 2009](image)

Source: Ofcom CMR 2010 Figure 5.8

**Pricing**

168. According to Ofcom, the competition enabled by the TSR led to reductions in price. Ofcom stated in its 2006 review of Telecoms markets that: “Broadband pricing gets aggressive. Throughout 2005, broadband prices continued to decline as speeds increased. These trends were driven by a combination of lower equipment costs, increased growth and scale, and more competition – particularly from LLU operators. [The] average cost of a 512K broadband access fell from £30 to £16 over the course of the year.”

47 Ofcom CMR 2006 paragraph 3.2.4.
Broadband penetration

In 2001, broadband penetration in the UK significantly lagged other countries. As can be seen from Figure 15, broadband connections per 100 households were only ahead of Ireland and China in Ofcom’s survey of countries. However, by 2006 the UK had caught up with many other countries. Its 2013 broadband penetration rate was 83% behind only

Figure 15. Broadband connections per 100 households

As can be seen from Figure 16, the UK now has one of the highest broadband penetration rates in Europe.

Annexe 1: LLU: 2005 Telecoms Strategic Review
**Conclusion**

171. The policies of equality of access and the suite of passive access remedies contained in the TSR had profound effects on the broadband market in the UK which live on today. The TSR directly addressed the enduring economic bottlenecks faced by competitors wishing to enter the broadband market in the UK to compete with BT. It transformed the nature of competition from a service based model of competition, where operators resold undifferentiated BT products, to a model characterised by investments, innovation and choice.

172. From being a broadband laggard, the UK has become a broadband success story as consumers benefit from a high degree of competition.
173. At the retail level, LLU has not led to uniform pricing. In fact, providers compete on a menu of prices of bundled services, and of levels of quality and service.

174. LLU continues to be offered alongside active remedies such as WBA and WLR. However, innovation and competition tends to be led by operators using an LLU based model.
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