Vodafone's response to Ofcom's consultation

"Business Connectivity Market Review: Preliminary Consultation on Passive Remedies"

January 2015

Executive Summary

1. Who still uses a Motorola StarTac mobile phone or continues to use the Microsoft Windows 95 operating system? The connectivity products that businesses rely upon first emerged in early 2000s at the same time these other products were launched. Just as mobile phones and computer operating systems have moved on, the requirements for regulated access services, 15 years later, have also moved on.

2. Since 2000 the market, technology and regulation have all taken incremental steps forward, to the point where we are now using Ethernet and not SDH, we pick up traffic locally instead of at far end points of aggregation and we use networks for more than simply exchanging emails or files.

3. This extraordinary evolution of applications, technology and network investment has led us to a place where incremental tweaking of regulated active products, through restricted and regulated processes is no longer sustainable or fit for purpose. The case for passive remedies in 2015 is remarkably clear and straightforward.

    a. It is inefficient to purchase capability that is not required. The active service bundling creates inefficiencies that customers are paying for and delivers negligible incremental value.

    b. CPs must be freed from Openreach's innovation shackles. Whilst CPs are constrained by Openreach's SoR process and BT's own commercial priorities, little innovation is actually delivered. Whether this is because of the collective agreement needed, constrained capital or capacity for development or a limitation of vision, the bottleneck that is the Openreach SoR process limits the whole market.

4. Passive remedies would overcome the Openreach innovation bottleneck and address the inefficiency of active products.

5. We see great opportunity for all from unrestricted passive products. Artificial limitations only serve to keep in place BT's control over the market, limit market growth and raise costs:

    a. Usage restrictions will create innovation restrictions which will limit the use of passives to mainly replicate of active remedies. This will deliver pricing efficiency in the short term, but little in the way of innovation or market growth in the medium to longer term.
    b. Whilst creating arbitrage is not desirable, sustaining artificial or historic pricing structures such as 'Active Minus' in order to not rock the boat are less desirable. Pricing and contractual terms should reflect the infrastructure nature of passive remedies and allow for IRU as well as shorter term leases.
    c. Common cost recovery will feature in any pricing mechanism, and we would expect that any pricing structure (and supporting regulatory framework) would recognise this, but should not have the sole aim of minimising risk associated with common cost recovery.

6. It is traditional to look around the world for successes in comparable markets to illustrate the arguments, however in this case, we do not need to look further than the success of passive remedies here in the UK. Potential risks to cost recovery or BT's ability to compete have not materialised. LLU has been an unmitigated success, unleashed both a new waves of investment as firms seek to compete more aggressively in a more dynamic and innovation-enabled environment whilst increasing overall market size and therefore connected consumers.

7. The move to passive remedies requires change. It requires investment from access seekers, process developments by BT and development of policy by Ofcom. It is not without risk; however the opportunities it creates for innovation and differentiation in the market make the risk truly worthwhile.

1. Introduction

1. Responding to the BCMR call for inputs we started our submission with the following:

   "*The regulated services provided in Business Connectivity Market (BCM) exhibit clear signs of market and regulatory failure today:*

   - *BT's profitability on these services remains high despite the current price control, especially for higher bandwidths;*
   - *Despite high profitability, service levels, innovation and responsiveness to customer need all remain woefully poor.*"

2. Since the time of writing our response to Ofcom's Call for Inputs in April 2014, the market outlook has not changed, however our body of evidence on the case for the need for change has expanded.

3. In preparing our response we reconsider previous evidence, newly commissioned expert reports and we also rely upon the response and evidence provided by the Passive Access Group (PAG). The following should be considered as part of our overall submission to this consultation:

   - Frontier Economics report prepared for Vodafone "Passive access in the business connectivity market June 2014[1]" submitted in response to the CFI
   - Frontier Economics report prepared for Vodafone "The case for dark fibre access Jan 2015"
   - Frontier Economics report prepared for PAG
   - Towerhouse report prepared for PAG
   - slides from meeting of bilateral session with Ofcom date (dark fibre)[2]
   - Slides from meeting of bilateral session with Ofcom date (BT profitability)[3]

4. The structure of this paper is set out below:

   Section 2 of this document describes how the market has evolved since Ofcom first looked at remedies for Business Connectivity.

   Section 3 addresses concerns about investment and co-existence of passive remedies and looks at experience from overseas.

   Section 4 addresses cost allocation and pricing structure.

   Section 5 looks at product scope and design

   Section 6 provides answers to Ofcom's consultation questions.

[1] http://stakeholders.ofcom.org.uk/binaries/consultations/business-connectivity-market-review/responses/Vodafone_Annex_2.pdf
[2] 25th September 2014
[3] 13th November

2. We're light years away from where we started

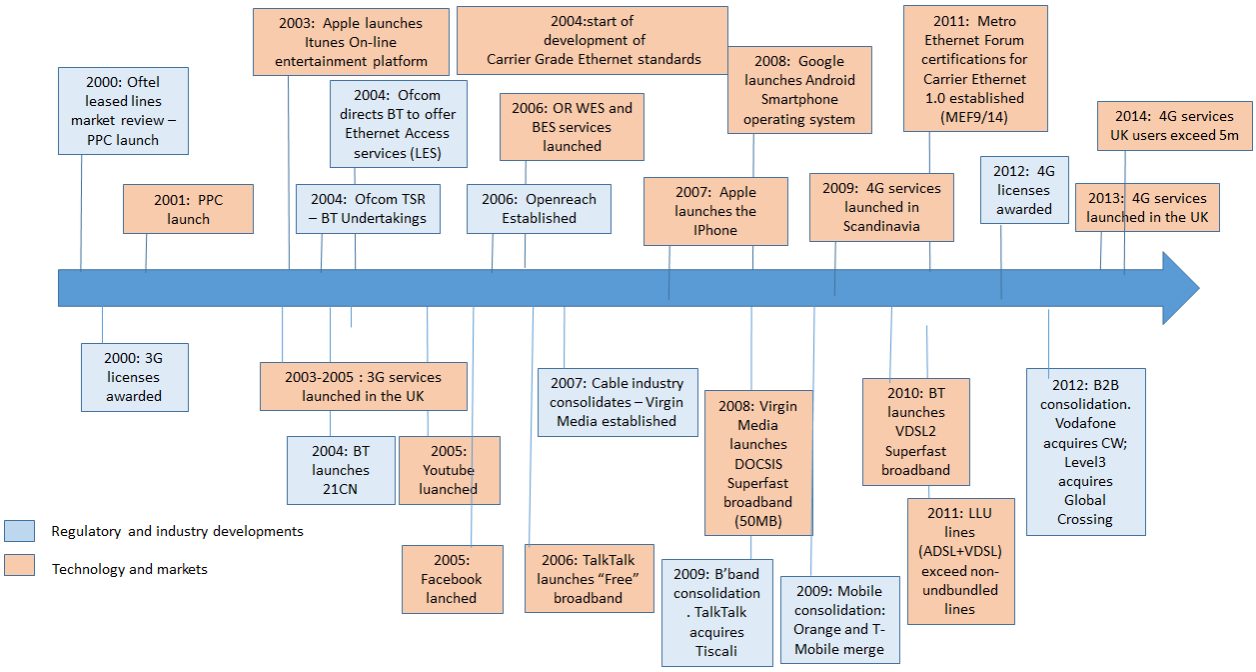
Vodafone believes that the advances in technology, increases in demand and progress of network roll out have taken us to a place where active products should not be the only focus of regulation in the market. Active access services limit innovation and customer choice. Passive access is essential to the future development of the wider market, service development and competition.

5. The active service regulation we have today was primarily laid down for the Business Connectivity Market between 2000 and 2005, with incremental periodic market review updates occurring since. Since the initial approach was set out there have been massive changes in communications technology which has in turn had a real impact on both our working and personal lives. It is critical that we assess whether those active remedies established in that early period remain suitable for the challenges of today and indeed are the best foundation to take us forward. Vodafone considers they are not.

6. We commissioned Frontier Economics (Frontier) to assess the development of commercial network roll out, technology and customer requirements from 2000 to today. This shows the technical evolution, regulatory development and the changing shape of CP network rollout and interconnection. As can be seen in the chart below, a considerable number of incremental changes have taken place. In our view, this has taken us to a place where the regulatory remedies required in the market are markedly different to those that were required in 2000. Today's remedies:

- no longer have to contend with high fibre costs,
- no longer have a variety of physical media and relatively long tail length.
- instead bandwidth requirements are increasing,
- Ethernet technology transports a variety of applications including voice and
- aggregation occurs in the CPs network, not in the access network.

Figure showing an event timeline for the communications sector



Source: Frontier Economics

7. It is astonishing to think that the time period illustrated above started pre unmetered internet, pre broadband and pre smart phone. We are now in a completely new world. Retail services have changed. Customer demand has changed. Frontier states *"This move to unmetered traffic has led to an explosion of demand driven by new applications. Customers now expect these applications to work seamlessly over different access networks with the evolution of fixed and mobile access networks allowing for customers to use ever increasing volumes of data."*

8. The network operators providing the services have over the period also changed. Mergers, acquisitions and network sharing agreements have resulted in many small network operators in the market becoming fewer and far larger network operators with far larger concentrations of data demand. Technology together with network operator presence has made obsolete service specific networks favouring multiservice transportation of bandwidth across multiservice networks. Previously active services provided value-add by BT as they have provided essential aggregation and transportation services allowing network operators to interconnect at a few key points for the collection of service specific traffic.

   A passive access remedy would make more of the value chain contestable leading to greater efficiency, lower costs and lower prices for end-users

9. Nowadays networks are far closer to the customers, at a 1000 plus local exchange locations (Vodafone has [data removed] local sites whereas TalkTalk has 3000). Network operators have moved their networks closers to the customer due to the rising data demand of modern services and in response to the regulation of LA services following the Undertakings. Traffic is now aggregated by the network operator themselves locally and backhauled on-net to the wider core network. Network gateways have moved closer to the customer at the edge of CPs networks and sometimes in the local exchange itself.

10. Frontier also arrive at this conclusion *"The market is now characterised by convergent transport networks using robust, flexible and cost efficient network protocols supporting a range of access technologies. This has radically altered network economics with the evolution of fixed and mobile access networks allowing for customers to use ever increasing volumes of data."* Frontier attributes the current environment to "*The emergence of Ethernet as an efficient transmission medium for IP traffic and the evolution of Ethernet standards, over a number of years, into so-called "Carrier-Grade Ethernet" meant that most of these quality and service risks were gradually addressed and tackled. These (and many other) developments have fully opened the Business and Wholesale communication market to a new network approach whereby high level of security, predictability and service levels can be delivered on "flat" and "multi-service" networks, which, by reducing the number of aggregation and multiplexing layers, use shared resources more efficiently.*"

11. Frontier concludes *"We believe that the existence of these widely accepted standards could provide a significant spur to the competitive dynamic, and that there is minimal risk that introducing dark fibre regulation will be overtaken by technology changes or may dis-incentivise migration to a new technology. To the contrary -- and similarly to the experience of copper access regulation (Local Loop Unbundling) where passive remedies coupled with prevalence of DSL standards resulted in vastly improved availability, quality and value of broadband services[4] -- fibre regulation could facilitate further competition and innovation in Ethernet services."*

12. The consultation acknowledges a wider move to passive access would make more of the value chain contestable and lower costs by allowing network operators to aggregate capacity more efficiently. This is the same justification of LLU operators who pursued a strategy of unbundling as Ofcom set out in A New Pricing Framework for Openreach from 2009:

    "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."

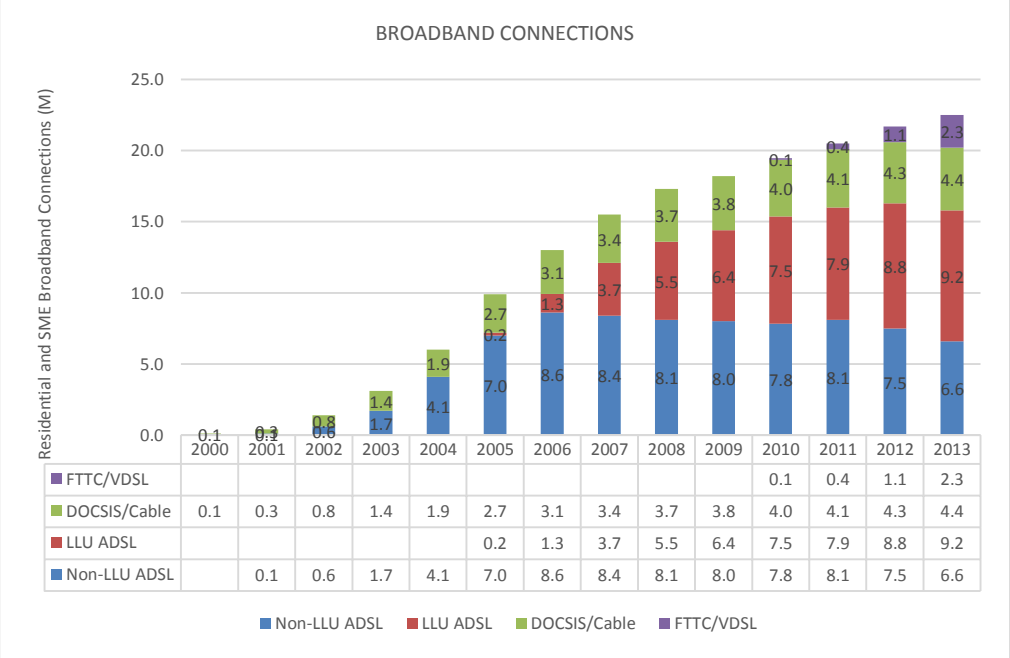
[4] p. 25 and 26 of this report

13. Today there are some 9.5 million lines provided using LLU primarily providing competitive broadband[5], which at mid 2014 was up at 77%. . This compares with just 16% of the population having broadband in 2004.

14. Frontier show us the same evidence over a time period from 2000 to 2013:

> "*In year 2000 less than 100k CATV customers were using broadband services in the UK. The bulk of users were accessing the Internet through dial-up services, which reached a peak of 12m users in 2002.*
>
> *At the end of 2013 there were almost 23m residential and SME broadband connections in the UK, of which almost 6.7m were provided "superfast" speeds (of 30Mbps and above) on VDSL2 and DOCSIS 3.0 Next Generation Access and 9.2m through Local Loop Unbundling.*"

Figure: Consumer and SME Broadband Connections 2000-2013



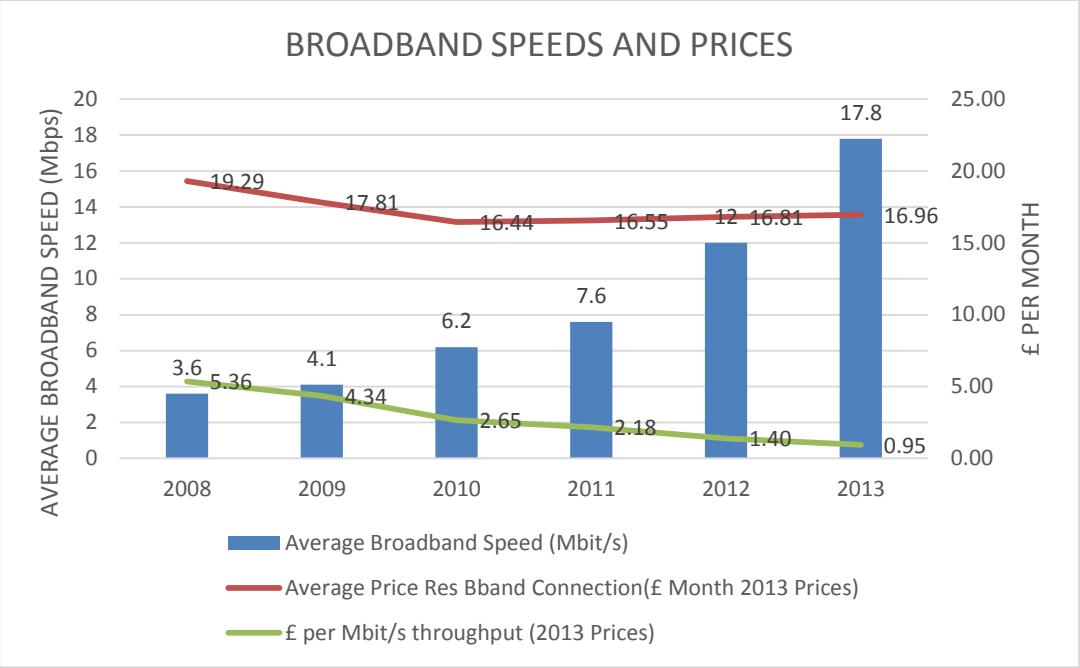
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
FTTC/VDSL											0.1	0.4	1.1	2.3
DOCSIS/Cable	0.1	0.3	0.8	1.4	1.9	2.7	3.1	3.4	3.7	3.8	4.0	4.1	4.3	4.4
LLU ADSL						0.2	1.3	3.7	5.5	6.4	7.5	7.9	8.8	9.2
Non-LLU ADSL		0.1	0.6	1.7	4.1	7.0	8.6	8.4	8.1	8.0	7.8	8.1	7.5	6.6

Source: Frontier Economics analysis of Ofcom Communications Market reports

15. Despite massive growth in tablet and smart phone ownership and usage average monthly household bills have fallen in real terms from 2008 to 2013[6], as a result of increased competition from LLU operators. This is shown below:

[5] OTA November 2014 http://www.offta.org.uk/charts.htm
[6] Ofcom Communications Market Report August 2014 http://stakeholders.ofcom.org.uk/binaries/research/cmr/cmr14/UK_0.pdf

Figure Consumer Broadband speeds and Prices



Source: Frontier

16. There is every reason to expect a similar long-term effect in relation to business connectivity services. Vodafone agrees, as discussed further in section 4 below, that the different nature of business connectivity markets means that the transition from active to passive products may take longer than that seen previously in the consumer broadband market.[7] Indeed this is positively a benefit for the orderly transition of regulatory focus from active to passive products.

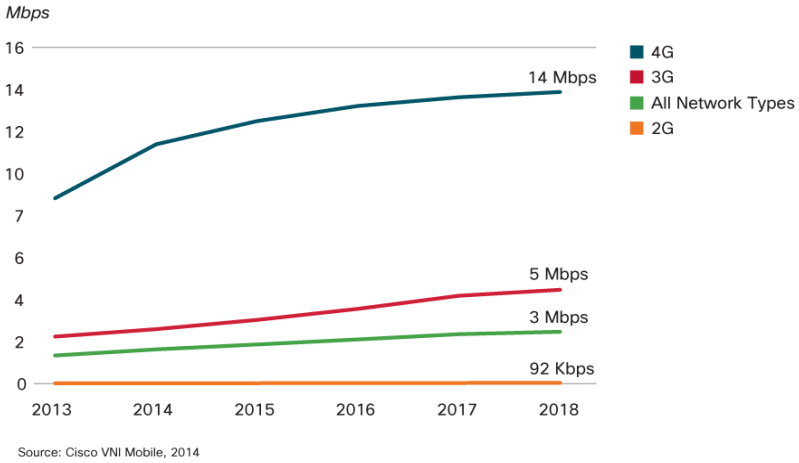
Passive access would also unlock more rapid innovation in the business connectivity markets as well as the consumer markets served via those inputs

17. It is our view that the active service model is no longer relevant for today's service environment and only serves to stifle innovation and competition. Consumers and businesses do not want to settle for what is available or affordable, but what is required to deliver the service and application experience. Expected increases in data requirements and therefore bandwidth demand in the future mean that the trends which we are seeing today will accelerate. CPs will need to innovate, and innovate at pace, to rise to the challenge of the environment around us.

18. For example mobile customers enjoy handset upgrades every 12 to 24 months. Each upgrade tends to unlock greater potential for faster services and a wider range of services. Consequently our networks and the networks of the services being reached are likely to require similar step-change capabilities to upgrade and reconfigure. The Frontier report says "*4G connections have on average download speeds 3 times as fast as 3G connections*"[8]

[7] [Add ref from Consult doc]
[8] Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2013-2018, February 5th, 2014

Figure: Average download speed for Mobile Networks



19. *The combination of much higher traffic volumes resulting from a combination of much greater spectral efficiency, a considerable increase in available spectrum and continuing demand growth from consumers means that the volume of traffic that can be generated by a base station has grown by an order of magnitude. As such mobile operators are seeking to replace self-provided PDH base microwave links with high capacity Ethernet links."*

20. Again, it is telling that this is exactly the argument put forward by Ofcom when considering local loop unbundling in the Pricing Framework for Openreach described above. It stated:

> *"It offers more control over the services that they [competing CPs] can offer. This allows greater product differentiation and increases the number of services available to consumers."*

21. However in business connectivity markets, too often such general market progression is halted today as BT has a stranglehold upon key inputs. Today our ability to manoeuvre in the market is limited to small *'me too'* incremental steps. Under the industry forum engagement and agreement processes (SoR) and the BT EMP release work stack, developments take many years of haggling to get to market, if indeed the concept passes BT's commercial thresholds[9]. These broken processes simply do not work for us especially when the market around us is progressing so rapidly.

22. Frontier state " *"We are now at a critical juncture in the evolution of the UK telecoms landscape, the availability of access dark fibre would largely remove remaining artificial bottlenecks and allowing exploitation of next generation mobile and broadband networks."* The availability of EAD LA and backhaul solutions is insufficient to sustain these future networks. In the context of mobile backhaul Ofcom's consultation recognised the potential of Cloud RAN (C-RAN) as a future solution (which is being deployed in other jurisdictions today). C-RAN equipment is hugely expensive to deploy, its emergence is highly dependent upon the cost of the bandwidth between sites. Interestingly C-RANs have emerged in Asian markets where dark fibre is available, but are part of the leading edge developments in 4G technology that we see in Asia today. We hold the view that only dark fibre access would enable a cost basis which permits C-RAN deployment. Dark fibre brings C-RANs into play which in turns brings the benefits of C-RANs to networks and consumers in the UK. The introduction of 4G (and the future use of 5G) technologies is rapidly increasing data consumption, meaning a consequent increase in both the capacity needed for each backhaul link and, due to the need for additional masts to meet this demand, greater volumes of backhaul links. This increase in data volumes will continue, as borne out by Ofcom's projections on data usage[10].

[9] BT's own plans and undisclosed future plans being cited as a reason for not progressing with the dark fibre SoR
[10] See for example Table 2 (page 19) of http://stakeholders.ofcom.org.uk/binaries/consultations/700MHz/summary/main.pdf"

23. In a suitable environment Vodafone is well placed to invest and innovate to meet the markets' needs. We now have a substantial fixed network in addition to our mobile network. We are preparing to enter the consumer broadband market and therefore will serve all markets and all demographics - business and consumer, fixed and mobile. This will be an enormous task but also an enormous opportunity for greater competition and new innovation. We see the move to passive regulation as the removal of a key barrier which has held the market back. Passive access will help us unlock competition and innovation and harness converged capabilities that will take us to the next level of product development.

24. We consider the Frontier Economics "The case for dark fibre access" report an insightful reflection of an environment that has markedly changed and the comparison against the available active inputs which have not kept apace and in our view incapable of supporting service adequately in the future. It forms an important part of our submission to this consultation process.

3. Co-existing remedies will work

Business services provided to larger corporate customers are complex and subject to long contract terms, therefore we will not witness an overnight transition between active and passive remedies. We believe that common costs will be adequately recovered over the coming review period. Presently BT is over-recovering costs for the provision of active services. Over -recovery is a proven occurrence which should be addressed, under recovery remains a theoretical concern.

25. Passive access regulation has occurred already in the UK and in many other countries around the world. The upcoming "Civils Directive" aims to encourage widespread duct access availability. In the UK we have LLU where naked copper is analogous to dark fibre, and also duct access for WLA service rollout. LLU in the UK has been unrestricted and highly successful in opening up competition and innovation and overall leading to market growth. The numbers of exchange lines is in growth as usage innovation occurs e.g. the creation of EFM. Rather than straight substitution of the active broadband and telephony services LLU has created new market opportunities.

26. Across Europe passive access regulations have already been in effect for a number of years. In Lithuania and Portugal duct access regulations have been in place since 2004. In these countries, regulations do not restrict use of access and alternative operators can therefore seek access for the provision of both enterprise and residential services. This is also true in other countries which have introduced passive access regulations more recently, including Italy.

27. Furthermore access to duct and/or poles is perceived by both the industry and the regulators in Lithuania and Portugal as having made an important contribution to the development of the market. This is seen through the roll out of fibre, the level of competition and penetration of broadband and Fttx. Furthermore, in Portugal, passive access regulation has contributed to innovation in fibre-based services, as evidenced by the range of triple and quad play packages available in the market.

28. Therefore, to properly weigh up the pros and cons of extending regulated passive access to business markets, we discuss in the following sections whether passive remedies could adversely affect BT and other CPs' incentives to invest.

29. Vodafone regards the availability of passive access as a mechanism to increase investment incentives. In other countries where we operate the availability of passive access has enabled network expansion – particularly in Spain, Portugal and Ireland which is summarised below:

30. Vodafone Spain has an agreement with Orange Spain to co-invest in fibre-to-the-home (FTTH) to three million homes and businesses across Spain by September 2015. The joint deployment has already reached 800,000 premises across 12 Spanish cities, so the companies will jointly deploy fibre to an additional 1.2 million premises in areas where the Ono (a cable company recently purchased by Vodafone in Spain) high-speed fibre network is not present by September 2015; and in addition, Vodafone will provide Orange with wholesale access to one million homes using the Ono network. Vodafone Spain also uses passive access for mobile backhaul with 2000 sites and a further [data removed] are planned.

31. Vodafone Portugal and Portugal Telecom have signed a similar agreement to deploy and share fibre networks reaching 900,000 homes in Portugal. The agreement, which commences in December 2014 and runs for 25 years, will enable each company to offer high-speed data services to an additional 450,000 homes and businesses throughout Portugal. The access provided by the Portugal Telecom agreement brings significant time to market benefits and will enable Vodafone Portugal to offer high-speed broadband, fixed telephony and television services to almost 2 million homes by the end of 2015. Vodafone Portugal also uses passive access for mobile backhaul.

32. In Ireland, ESB and Vodafone signed an innovative joint venture agreement to invest €450 million in building a 100% fibre-to-the-building broadband network offering speeds from 200 Mbps to 1000 Mbps. Ireland will also become the first country in Europe to utilise existing electricity infrastructure on a nationwide basis to deploy fibre directly into homes and businesses, initially reaching 500,000 premises in 50 towns.

33. In another example, alternative operators took advantage of duct access regulations in Lithuania to become the first-movers in the deployment of Fttx in the country. It was only a few years later, and partially in response to competition from alternative operators, that the incumbent began to deploy its own Fttx network. Today, Lithuania has the highest penetration of Fttx in Europe at just under 35%[11] and consumers in the country can choose from a number of competing operators. This is particularly notable given the relatively small population of the country. The Towerhouse report for PAG provides further extensive examples of passive access usage around the world.

34. History has shown us in the case of passive copper access (LLU) that extensive new investment was made in both network presence and service innovation. Many innovations were made first by the new entrant. For example, "LLU operators" Bulldog, Updata and Easynet were among the first to deploy EFM. Indeed, Bulldog actually sold EFM capability to BT since they productised it well before BT could do so. ADSL2plus and Annex M (for faster upstream speeds) were also deployed by LLU operators such as Be Unlimited before BT. Several LLU operators built networks to ~1000 or more exchanges to provide greater innovation based on competing active network infrastructures. This provided differentiation and decoupled them from BTs Product Development roadmap (at the active access layer). The result was a period of unprecedented innovation in UK broadband products and accelerated time to market for the new technologies. This ability of LLU operators to innovate and deploy more rapidly than the incumbent was not unique to the UK. The same ability of LLU operators to outpace incumbents at the active network layer was also proven by Fastweb in Italy, Free in France, QSC in Germany and by Covad and Northpoint in the USA.

35. It is clear from the plans from alternative network operators wanting passive access that passive access will lead to further construction of networks based upon modern architectures. Ofcom's consultation document discusses Colt's desires to use passive access to build further metropolitan rings using duct access and connecting these together using dark fibre. It is clear that this type of network extension by Colt is not possible absent the availability of passive access.

36. Rental of passive assets from the national infrastructure provider may be the most economically efficient solution – more so than duplicate provision of such assets or rental of active products, with all the limitations that this brings. Furthermore if BT's infrastructure is more economically efficient to use, then CPs will free up capital to invest in other, more contestable parts of the service delivery chain and new services themselves. A dark fibre / duct access remedy would be market enhancing, growing the market rather than merely providing a substitute.

[11] FttH Council

4. Cost Allocation and Pricing Structure

Common cost recovery needs to be addressed but should not stop us from implementing passive access remedies.

37. In the following section we address the co-existence of passive and active remedies. Vodafone considers that transition to passive remedies will be restricted by end customer contract commitments. The availability of passive remedies is most likely to aid new product development and the installation of new customers and new network capacity. As innovations to services based upon passive inputs are developed we expect incremental growth to occur. We do not envisage a wholesale migration of our existing installed base, although a migration option would be required. Vodafone considers that for the period of transition (which will probably span two, if not more, market reviews) active and passive remedies can and should co-exist. This in no way undermines the long-term case for passive remedies.

38. What it does mean is that the transition process to passive remedies is smoother and more manageable than suggested by, for instance, Figures 2 and 3 in the consultation document. Passive remedies simply will not result in the collapse of the cost apportionment and cost recovery systems in place within BT today. Our evidence is based around three pieces of expert work. Firstly in our response to the CFI, Frontier Economics report "*Passive access in the business connectivity market June 2014*", the basic case for dark fibre access is made along with a review of BT's capability to recover appropriate costs. Secondly the Frontier Economics report "*BT profitability and price regulation*"[12] builds on the 2013 report by Frontier showing BT's SMP services recovering £4.9B in profit in excess of reasonable returns over an 8 year time period. Lastly the Frontier Economics report "*Costing and pricing for passive access remedies"* prepared for PAG[13] looks at the issues of costs and prices in a move to a passive regime.

39. Looking at costs and cost recovery for a new product should be under taken via a measured, step-by-step approach to costs, understanding the materiality and impact of allocation options. Some of the initial questions that spring to mind as a result of Ofcom's consultation include: First, what is the "*relatively significant*" contribution which BT's sales of high bandwidth wholesale leased lines currently make to its recovery of common costs? Second, would prices need to rebalance to give BT its 'fair bet'[14] of recovering those costs or is there an over-recovery at present? Third, if displaced costs do need be recovered, which prices, by how much and do such changes give rise to any other regulatory concerns such as distributional effects?

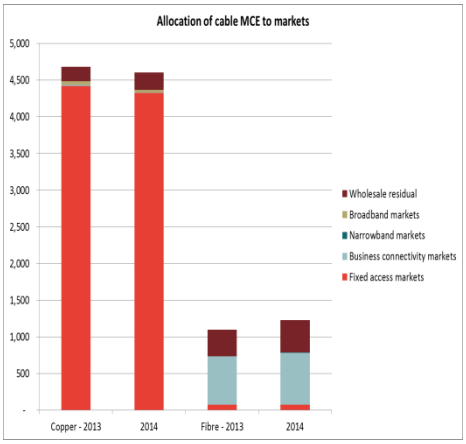
40. First Frontier's analysis identifies that approximately 80% of BT's total common costs are recovered by copper products. As in other EU countries copper based mass market residential products are the primary volume product.

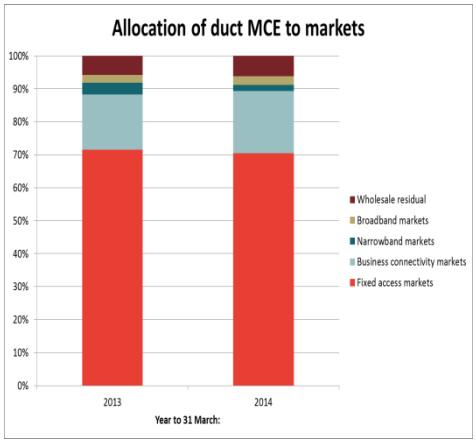
41. Contribution of fibre based services to common costs is smaller than might be imagined at only 20%[15] of the overall total.

42. The RFS show us the allocation of cable costs across markets. This is summarised in the table below, and shows us that the majority of "cable" is used to deliver mass market access services as illustrated in the taller columns. The proportion of fibre costs is shown in two separate columns with the fibre costs relevant to BCM markets shown in light blue.

43. Similarly we can see the allocation of duct costs across markets. This is summarised below[16] and shows us that circa 20% of duct costs (illustrated in light blue) are allocated to BCM.

[12] Provided to Ofcom 11th November 2014
[13] Submitted with the PAG submission
[14] Not, we note, a cast-iron guarantee of recovery as is sometimes implied within the consultation document
[15] The 20% contribution by fibre services has been calculated for us by Frontier within the report for PAG.
[16] Source Frontier PAG report





44. Ofcom assumes the BCM proportion of the cost recovery would be at risk of non-recovery as a result of passive regulation. This is discussed in the consultation document which considers a couple of scenarios which see common costs recovery affected by under recovery. Vodafone considers that this analysis is based upon invalid assumptions. Ofcom only considers the substitutional case and does not consider the case for overall market growth. We do not see passive access as a re-cutting of the current "pie" but rather an opportunity to increase the overall market size. Given all the indicators in the market of increasing bandwidth demand, new services and applications and ongoing and advanced connectivity needs overall market growth and bandwidth demand growth must be a certainty[17]. Simply moving from 3G subscriptions to 4G subscriptions customers are using 3 times the amount of data[18]. Similarly, fixed enterprise users are demanding higher bandwidth access circuits with significant growth from 2012 to 2013 100M and 1G EAD connections. Ofcom's headlines in the Communication Market Report 2014 has further supporting headlines of growth:
    a. "we are communicating more than sleeping";
    b. "tied to our tablets and smart phones" – tablet ownership has doubled to 44%, one in six has a smart phone.
    c. 6 million subscribers have 4G
    d. A quarter of fixed broadband connections are superfast

45. Moreover and most importantly, Ofcom's analysis does not take into account any common costs recovered from sales of passive access.[19] The prices which we calculate and propose for dark fibre in section 4 allow for the recovery of all common costs associated with the provision of the passive dark fibre input. In the scenarios which Ofcom puts forward for the loss of common cost recovery by a reduction in sales of active products an off-setting counter addition of sales from passive services is not made. When we look at the common costs that are to be recovered we look at the common costs associated with the provision of the service up to and including that dark fibre.

46. Further costs relate to the provision of an active service and are therefore avoidable as volume changes occur. If there is a large proportion of common costs that remain recoverable only from active circuits, then that is not a reason not to allow passive circuits – rather it is a pointer to the idea that Ofcom may be encouraging BT to invest in products whose economic life has passed, and protecting BT in doing so by allowing them a guaranteed return. It is hard to see that this is in the consumer benefit.

47. Ofcom's decision to allow BT to choose how to allocate common cost recovery amongst products inherently severs any link with cost causation –it allows BT the opportunity to "beat the cap" by loading costs approximately scaled to bandwidth in the knowledge that growth is likely to be greatest in high bandwidth products, when it is not at all clear that this is how costs are actually incurred. This may be to BT's benefit but it

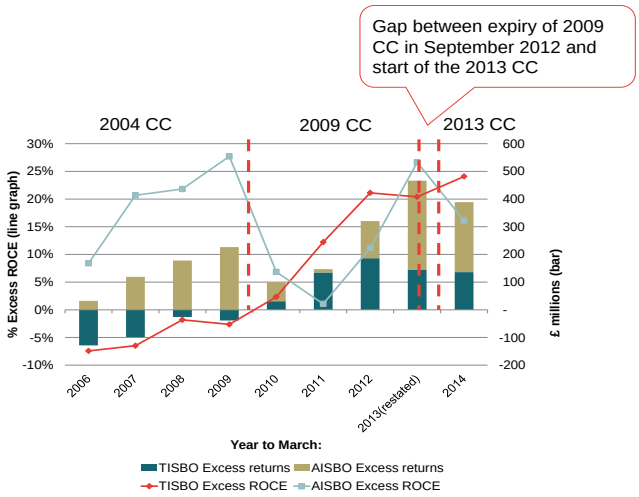
[17] See Frontier report in response to the CFI
[18] Add reference
[19] See Figure 2 in the consultation document.

is not at all clear that it is to the benefit of UK consumers and UK businesses as pricing decisions could be taken to suppress demand if BT so wished.

48. We know that BT is over-recovering costs in Business Connectivity markets and has been for many years. In November 2013 Frontier Economics published a report following a study commissioned by Vodafone which looked at the returns that BT makes across its SMP services. At that time it was found that £4.9B of excess recovery had occurred over an 8 year period[20]. In November 2014 we re-looked at the analysis and updated the numbers to include the year end March 2014. A further £600M of excess recovery occurred in 2013/14 alone, demonstrating that the gap is not being closed. The largest proportion of this excess comes from regulated wholesale business services.

49. The chart below extends the excess recovery analysis to look at the key BCM services – PPCs (TISBO) and Ethernet (AISBO). It shows us that for both these services excess recovery is occurring and continuing to occur.

Figure showing excess returns for PPCs and Ethernet



Source Frontier

50. Therefore Ofcom's concerns about under-recovery of costs, whilst valid, feel at odds with the enormous over-recovery in business connectivity products. We see far greater risk from the ongoing over-recovery of active services. It is evident that today's prices for active products contain excess profit "fat" allowing BT to recover well in excess of the regulated WACC. The excess that BT is charging for services today is leading to consumers paying far more than is necessary for services, in the last financial year alone, Ethernet products over-recovered (based on WACC) an excess of £250M profit.

51. The analysis above shows that regulated prices for active services could be substantially lowered from today's levels while simultaneously introducing passive remedies without in any way endangering common cost recovery. Therefore, the potentially disadvantageous distributional effects to which Ofcom refers in the consultation simply do not arise. We are of the view that the upcoming BCM should both eliminate ongoing over-recovery for active services and introduce the regulation of dark fibre and duct access for BCM use.

52. If, at some point in a future review, it can be shown that all excess recovery from active regulated services has been eliminated and BT's 'fair bet' is seriously in jeopardy then we agree that Ofcom will need to consider some of these issues. Even then, it is unlikely that significant detrimental effects will occur given the much larger volumes of (say) access products over which such common costs can be recovered. And whilst valid concerns about cost recovery need to be addressed, it should not limit the decision to regulate passive access.

[20] http://www.frontier-economics.com/publications/the-profitability-of-bts-regulated-services/

53. We have an opportunity to embrace passive access remedies. We feel that Ofcom's concerns are not matters of principle, more matters of practice – whilst the fears that Ofcom expresses should be examined, their materiality or complexity will only be apparent under detailed scrutiny. A detailed investigation into the mechanics of common cost recovery under a mixed active/passive regime is required to assess the real impacts on service prices for active and passive products. If Ofcom then finds that there would be spill-over effects into other regulated or non-regulated markets, then that is something that should be quantified and addressed, Ofcom has overcome other more material changes in regulatory structures in the past and has not shied away from implementing bold decisions because of their complexity. We urge Ofcom to address passive access in the same light: an important policy to be implemented with wide ranging benefits, with some interesting issues to address in order to get it working as intended.

Pricing structures will determine the success of the passive remedy

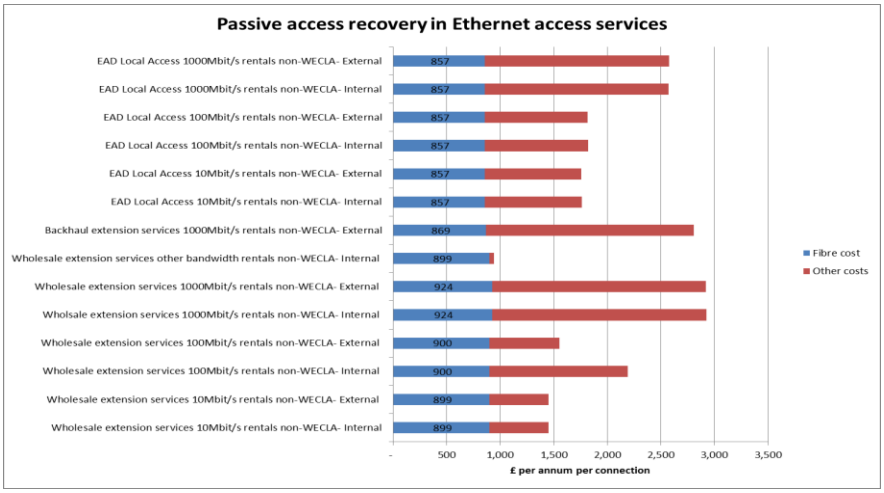
54. Ofcom recognises that the chosen pricing structure has a number of implications. An Active Minus approach will not allow dark fibre to deliver the innovation that is possible. Whilst arbitrage is not a desirable outcome, avoiding it should not be the sole aim of a chosen pricing structure. We propose that Ofcom looks at the underlying costs and bases prices on that foundation.

55. Frontier show us that "A dark fibre cost can be derived in BT's RFS for existing prices." It is possible to derive a dark fibre price which is bandwidth neutral. Frontier shows us that this would be in the region of £450 to £860 per dark fibre circuit.

56. "The total cost of access fibre consists of the costs of the fibre cable itself plus a share of the costs of BT's ducts. The share of duct is the result of an allocation between core and access and then an allocation within access between access fibre and copper[21].

57. Access fibre and the associate duct is then allocated across Ethernet services on the basis of the number of fibres used and a weighting factor which differs between WECLA and non-WECLA lines[22]. As a result the cost of passive elements allocated per local end (inside or outside WECLA) is the approximately equal for all services delivered[23] as shown in the chart below."

Figure showing allocation of fibre costs and other active costs within current prices



Source: Frontier

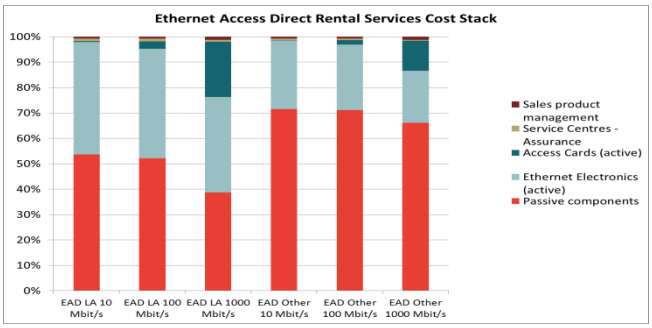
58. The blue portion of the bar chart above represents the total cost of the dark fibre which for EAD LA non WECLA is approximately £860pa based on a single fibre solution for a short distance link. For a WES non WECLA service

21 There may be an element also allocated to GEA fibre but this is unclear.
22 It is unclear how this weighting factor is derived, for example whether this is based on line length
23 There is a small amount of variation but the reason for this variation is not clear.

based on a two fibre solution for a distance of up to 25km we see that the dark fibre is approximately £450pa. A BES non WECLA also with a 25km reach (based on a two fibre solution) is slightly less costly than a WES.

59. The red portion of the bar chart above is the representation of the additional costs which are necessary to convert the passive inputs into the active service. These are shown in detail below. From the costs stack below we can identify the activities of sales product management, access cards and Ethernet electronics which can simply be removed as all these costs will be avoided by BT when providing a dark fibre input. Service centre assurance will be required in some form.

Figure showing Ethernet cost stack by cost type



Source: Frontier

60. This initial based on publicly available information makes a first attempt at a price for dark fibre. Whilst it does no doubt have its flaws, it provides a starting point for analysis. It shows that it is possible to create a price for the product without too much complexity.

5. Scope and Design of Passive Remedies

Dark fibre and duct access are complementary and are essential to the environment of today.

61. Vodafone is a mobile and fixed business serving the needs of residential and business customers. We see the need for both dark fibre and duct access as these inputs are complementary in nature. At our bilateral meeting we discussed the needs of our business for dark fibre and duct access. The density of our customer base will determine the viability of either dark fibre or duct access at a given location. Local deployments of duct access at business market may well require dark fibre for backhaul connectivity to our wider network. We have recently announced our entry into the fixed consumer broadband market. We will want to share our infrastructure between our customer types without restriction.

62. Vodafone does not agree with any restrictions based upon end product provided via duct or dark fibre. Such product limitation will simply destroy the opportunity for innovation and destroy the opportunity for market growth and new market development. Product usage restrictions would make the passive access product a substitutional product and bake in the concerns that Ofcom has with passive access.

63. Vodafone recently submitted an SoR to Openreach requesting the supply of dark fibre. This was rejected after limited analysis. In that SoR we set out our requirements for dark fibre which included features such as:
    - Dark fibre direct customer connectivity.
    - No restrictions to be imposed on the nature of the equipment, customers or services which are to be connected to the dark fibre.
    - 1 or 2 fibre options.
    - Distance availability aligned with technical capabilities available from electronics vendors (& should not be restrained by restrictions on current active products).
    - Resilient routing where possible.
    - Collection of the fibre should be at a) local exchange, b) CP location, c) joint box d) any relevant agreeable location.
    - Route maps for standalone survey, AOMP.
    - Pricing options should include IRU.
    - Dark fibre direct customer connectivity should have a minimum contract term of no more than 12 months.
    - Service Level Agreements on provision and repair, with SLGs for late provision and repair.
    - The ability to migrate free of penalty to dark fibre from active services, whether WES/WEES/BES, EAD-LA, EAD, EAD-ER, TDM-A, OSA, regardless of term option xviii) moves and shifts permitted of either end (but not both A and B at same time on same order).
    - No restrictions on use or on CP's ability to sublease capacity to OCPs.
    - Updated testing approach to accommodate new dark fibre product.

64. This non-exhaustive list reflects the opportunity that dark fibre and passive remedies provides, and that restrictions on use will impact any business case for their use.

[Confidential text and charts removed]

6. Ofcom's specific consultation questions

Q1: Do you agree with our preliminary framework for considering the case for passive remedies?

Please refer to paragraphs 5 – 24 in the earlier sections as these form part of our response to this question.

- BT has SMP in fibre access.
- Dark fibre remedies would introduce commercial and technical innovation.
- Dark fibre remedies would be more efficient that active remedies.
- The introduction would allow a gradual roll back of regulation of downstream services, however the medium term would see dual running of remedies would be also provide beneficial stability in the market.
- Common cost recovery needs to addressed, however is not insurmountable.

Q2: Do you agree with our preliminary views of the potential benefits of passive remedies? Please provide evidence to support your view.

Please also refer to paragraphs 9 to 24 in the earlier section as forming part of our response to this question.

The introduction of passive remedies would have significant productivity and competition benefits.

- Static and dynamic productivity enhancements would be possible as CPs can run services without the need to purchase Openreach Ethernet technology.
- Infrastructure control would also allow CPs to minimise the requirement to coordinate with BT in service delivery, testing and fault management processes, with consequential improvement in efficiency and service quality;
- Fibre availability and the ability to bypass cumbersome BT SoR processes would spur innovation in fast growing parts of the market for instance very high speed backhaul services (10Gbps and above), Software Defined Networks, Carrier Ethernet Networks as a Service (Naas) which would allow customers to dynamically configure their services;
- Although Ethernet is today's favourite network technology, who knows what it'll be in a decade or two. But forcing CPs down the active route means CPs are inherently locked into BT's technology choices which will ultimately stifle innovation when the next "big thing" comes along

Q3: Do you agree with our preliminary views on the impacts and risks of passive remedies? Please provide evidence to support your view.

Please refer to paragraphs 37 – 60 in the earlier sections as these form part of our response to this question.

Any change will involve risks, however not making changes is a risk in many instances.

- Creating a framework for BT's appropriate cost recovery has been done many times before on many other products, it should not be daunting.
- Not implementing passive remedies risks 'the path not taken' and therefore the missed opportunity of innovation and new opportunity.

Q4: What are your views about the potential impact of passive remedies on the pattern of common cost recovery and the associated distribution impacts?

Please refer to paragraphs 37 – 53 in the earlier sections as these form part of our response to this question.

- If regulated prices are set in line with appropriate costs to ensure efficient cost recovery, returns on existing investment would be guaranteed, and price signals with correctly shape investment behaviour.

- There is likely to be some arbitrage as a result of a transition to a new framework. Ideally we would be able to manage it, but this is not a reason to stick with an existing framework (for instance Active Minus pricing) or not implement passive remedies.
- BT has consistently over-recovered on active Business connectivity services over the last two price controls, and therefore under-recovery risks might appear theoretical.

Q5: Do you agree with our initial view that mobile backhaul and fixed broadband backhaul are likely to be the primary applications with significant demand for passive remedies?

- Backhaul is likely to be a large user of passive remedies, however many Business customers require high bandwidth connectivity (classed as AI).
- The added flexibility for CPs to support frequent network upgrade and enhancement requested by their corporate customers would be a plus;
- Where an investment is made in fibre in a particular location, perhaps we the result of a need for backhaul or a large customer requirement, other customers could be served more efficiently too.

Q6: What benefits might duct access offer over dark fibre and vice-versa? Is there a case for having both remedies?

Please refer to paragraphs 25 – 36 and 61 in the earlier sections as these form part of our response to this question.

- Duct access would be enable CP's to deploy significant amount of fibre, for instance using 144/288 fibres cables, hence ensuring sufficient fibre availability in support of high demand for bandwidth and could overcome BT's current point-to-point active service architecture by deploying local rings.
- The provision of dark fibre allows more immediate roll out of services by the CP and would be a better solution where customer density is not expected to be high enough to implement a fuller local network solution.

Q7 If passive remedies were restricted to particular product types or geographic areas how might this affect the usefulness of the passive remedies?

Please refer to paragraphs 61 -67 in the earlier sections as these form part of our response to this question.

- Any restrictions will limit the usefulness of the product.
- Restricting pricing so that it takes account of history more than costs; restricting the use of the products or limiting their availability all remove the benefits that can be accrued from passive remedies.

Q8: What arrangements would be appropriate for the supply of new infrastructure of access remedies?

Please refer to paragraphs 54 to 60 in the earlier sections as these form part of our response to this question.

- Passive products should be offered on a cost orientated basis.
- Products should be offered on an EoI basis.
- The prevailed ECC regime can be adopted to deal with circumstances of new network requirements for passive inputs.

Q9: Do you agree with our initial views about the non-discrimination arrangements for passive remedies?

- Yes, we believe that and enforceable Equivalence of Inputs ("EOI") approach is the only way to ensure a level plain field between BT's customer facing entities and other CPs.

Q10: In light of the trade-offs identified, which broad options on pricing do you consider would be the most appropriate for passive remedies and why? Please provide details if there is another pricing approach you consider would be appropriate in light of the considerations highlighted in this section.

Please refer to paragraphs 37 - 60 in the earlier sections as these form part of our response to this question.

- Product prices should reflect costs. A cost orientated charge including a fair contribution to common costs of the passive inputs can be readily determined from the RFS. We consider that the charge is compatible with full common cost recovery and the current active framework.
- We oppose an active minus pricing regime as we consider that this will lead to product use restrictions and ultimately limit the full potential of passive remedies. An active minus approach will require ongoing regulatory monitoring and intervention as BT develops new active services. We consider such a framework will be contentious and subject to ongoing disputes over time.

Q11: If a value-based (active minus) approach to pricing dark fibre were adopted, what do you think would be an appropriate active wholesale product (or products) to reference?

- We do not believe that such a scheme is workable as it reduces the benefits and purpose of passive remedies and also would lead to constant regulatory intervention (including on matters such as "What would be an appropriate active reference product")