5th December 2007

BT's response to Ofcom's Consultation document:

Future Broadband

Policy approach to next generation access

BT would welcome any comments on the contents of this document which is also available electronically at http://www.btplc.com/responses

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Executive Summary

- BT is dedicated to helping its customers thrive in a changing world. That means delivering communications, faster, quicker and cheaper than ever before. The debate about Next Generation Access promoted by Ofcom, Government and other stakeholders is important and one that BT welcomes. It a debate primarily about services rather than technology – services that customers want, that aid competitiveness, and that augment the position of the UK as a leader in communications and innovation.

- The UK is a world leader in broadband in terms of availability and take-up. Our broadband market is fast-moving, highly competitive and driven by the services customers want. The challenge to all industry players is to continue to innovate and meet customers' increasing expectations.

- At this stage the future scale of investment in next generation access remains unclear. But it is an important and welcome first step to be clear about the regulatory framework that will apply. Once settled, that should remove one area of uncertainty and risk from business cases

- Fibre technologies will clearly play a part going forward but so will other technologies. BT will be rolling out broadband at up to 24Mbit/s nationwide over copper from spring 2008 and other technologies will also have a role to play and cable and wireless solutions are expected from others. Fibre is already provided extensively to businesses in the UK for broadband and other high speed services.

- For the foreseeable future there will be a 'mixed economy' of technologies and providers. But it is not just investment in the access network that matters – BT, through its 21CN programme, is making substantial investments to improve the ability of backhaul and core networks to carry faster broadband services. These investments are arguably more important in the near term to enable users to get full benefit from their broadband applications.

- Ofcom is rightly wary of international comparisons which are often misleading. BT agrees with Ofcom's conclusion that there is no evidence of UK market failure. We also agree with Ofcom that although there is likely to come a point in the future when some consumers may demand services that require speeds greater than current networks can provide, the demand for such services is currently hard to judge. The commercial case for fibre investment is challenging for all industry players and needs to be market-led, based on consumers' willingness to pay and taking advantage of the complementarity of different delivery mechanisms (i.e. narrowcast over broadband, broadcast over DTTV). Early fibre deployments, such as the Ebbsfleet new build site, will allow service providers to see what types of services might be developed to utilise the capacity and give a better idea of demand.

- Ofcom is concerned to ensure that regulatory uncertainty is not a barrier to timely and efficient market-led investment. Its approach is about regulating NGAs *once* investment has taken place, rather than seeking regulatory means of incentivising investment. BT agrees with Ofcom on the regulatory principles underlying its approach which are fully consistent with the current regulatory regime, underpinned by BT's Undertakings. Where BT will offer NGA products in the future, we will do so on a wholesale, equivalent basis – this is the key to a vibrant, competitive market - and we believe anyone building a next generation access network should have the same responsibility to make that available to all service providers.

- It is important that the regulatory environment gets the balance right between the recognised need to protect and promote competition in the legacy copper world and the need to ensure that false signals are not given that deter industry from migrating onto new technology and new business models. The pricing of current generation wholesale services needs to be set at the right level to cover costs plus the required return. A coherent set of prices and margins across current and next generation access services is important if incentives are to be appropriately aligned.

- BT agrees the need for a clear and transparent transition process for both industry and consumers from old to new technologies but there must be no continuing requirement to maintain a copper network alongside new fibre.

- There is clearly a need to ensure that the appropriate return can be made on fibre investment to reflect risk and BT welcomes the consideration of innovative mechanisms, but equally a secure and enduring financial framework over the medium term is required to make major investment viable. If pricing is set purely in reference to today's copper pricing, it may act as a considerable barrier to investment.

- More fundamentally, there may be the need for a new industry model if major NGA investment is to be encouraged. The potential scale of NGA investment is daunting. In the absence of a proven commercial model, moving towards a UK NGA is only likely to begin as a series of incremental steps, each separately justifiable in its own right, which in time will, if applications emerge and value flows through to the access investor, build to a meaningful momentum. Such incremental beginnings are already visible: BT has made commitments in respect of new build sites and Virgin Media is extending the capabilities of its network. But the full benefits of NGAs are only realised if applications and services exploiting their capabilities emerge. That requires content owners to have confidence that they can address a growing customer base on similar terms and through common platforms and processes, irrespective of who the network owner is.

- If, as seems likely, first deployments are limited and fragmentary, the issue which arises is how those deployments can be made available to the content, application and service provider industry, so that a significant addressable customer base is generated, and opportunities for service

innovation maximised. It is also important for consumer choice that individual consumers are not left out of the competitive marketplace, with first movers creating a vertically integrated 'lock-in' for all next generation services for a particular household or geography.

- Throughout the value chain, those building and those seeking to innovate and provide services on NGAs need to recognise their part in building towards a UK scale deployment. That means a common commitment to open wholesale access and a common commitment to open standards and platforms allowing downstream service, content and application providers and developers to engage on similar terms with all NGA deployments. It means equivalent access to bottleneck assets, in a way that preserves and enhances customer experience, taking advantage of the next generation technologies.

- This form of collaboration will not necessarily arise without the direction and support of regulators, and the creation of enabling industry fora. But without it the content and applications industry will lack the scale of opportunity to build new services; and the virtuous circle of service innovation leading to improved returns on investment, leading to accelerated deployment could be stymied before it can begin. The vibrancy and benefits created by the current generation of industry structure will be lost.

- Collaboration also relates to funding models. Just as content and application owners need access to the networks others build, so must they also be open to new commercial models which contribute to the costs of those networks. For example, some business models may lead to content owners or service providers supplementing the charge paid by a consumer for their broadband access where this would enable the provision of bandwidth intensive content.

- Collaboration can also mean working together to ensure NGA deployment relates to areas of known and more certain demand. For example, service providers may be able to identify areas of intense demand and offer some form of security or commitment to encourage focussed network deployment.

- Regional Development Authorities, the Devolved Administrations or sub-regional economic partnerships may value and wish to pay for the contribution NGAs may make to local demand stimulation and investment. Where funds are available and state aid rules permit authorities may wish to contribute to the construction of duct and access networks in specific locations. In these circumstances the question will arise as to how such networks are to be managed and provided to all parties on a non-discriminatory basis. There may well be a collaborative role for Openreach to play in these circumstances. Collaboration also means better coordination between regulators, government, planning authorities and RDAs to remove barriers to NGA and enhance conditions, both nationally and locally, to encourage the market to develop.

- The UK is unique in the progressive regulatory environment Ofcom has promoted. The functional separation model and the creation of Openreach, unmatched in any other country, have created significant innovation, competition and improvements in quality on the basis of equivalence. The UK now has the opportunity to extend that model of equivalence into the NGA world and leap-frog the rest of the world in terms of a similarly competitive, innovative, customer-centric landscape, rather than, as seems to be the risk in other economies, setting out on a path that could lead to patchy geographic coverage with vertical integration denying effective consumer choice.

- BT supports the principle of promoting competition at the deepest level in the network where competition is likely to be *effective* and *sustainable.* We welcome Ofcom's recognition that an 'active' access remedy is likely to be the most efficient means of ensuring a competitive NGA wholesale market. BT's proposed Generic Ethernet Access approach offers both efficient, economic delivery and the scope for innovation and competitive differentiation and BT believes that this approach, which Openreach are consulting on with industry in relation to Ebbsfleet, is the appropriate wholesale offering for both fibre to the cabinet and fibre to the home deployments. The technical problems and economic challenges arising from duct sharing, dark fibre and sub-loop unbundling suggest that the GEA approach offers the best prospect for sustainable investment in NGA networks and to support competition in NGA services.

- BT welcomes the flexible approach shown to date by Ofcom in considering the regulatory regime for the early phases of the Ebbsfleet development. A pragmatic approach to regulatory obligations is essential to this pilot phase. It is important that Ofcom continues to recognise and encourage innovation and experimentation as industry tests the market for higher bandwidth services. At the same time, as deployments begin to take place, Ofcom has a role in ensuring that there is interoperability and open standards and we avoid a piecemeal approach with additional cost and complexity for downstream providers to the detriment of consumers.

- BT agrees with Ofcom that there is currently no general case for direct public intervention in NGA investment given that the social value of higher bandwidth services is currently unclear. The public sector should be looking at ways in which it can encourage the market to provide rather than seeking to deliver such services itself. However, there may be a case for funding by RDAs or local authorities in certain regions, subject to those meeting Ofcom/BERR and state aid guidelines. Such local initiatives potentially offer the opportunity to increase the UK fibre footprint and allow some technical and commercial trialling. However, we would not want to encourage inappropriate uses of public money nor see a patchwork of different networks, built on different technologies, emerging. Similarly, we do not yet see a case for an interventionist regulatory regime designed to specifically engineer fibre investment but it is important to distinguish this

from the need to ensure that the regulatory regime is not a barrier to new investment.

- It is important that Ofcom acts with speed and clarity to take this debate forward. The sooner there is a clear statement about future policy such as the commercial framework for investment, the co-existence of copper networks and the protection of legacy obligations, the sooner industry can plan for the future and some initial deployments to test customer demand and applications can start.

1. Introduction and broader context

The definition of next generation access networks

The terms of the current debate about next generation access networks (NGAs) are understandable. As Ofcom observes in its consultation document, the only part of a telecom service provider's infrastructure which is directly visible to end customers is the access network and hence the debate about the demand for higher bandwidth broadband services and the extent to which that demand can be satisfied by existing networks has come to be seen as the question of when will the copper access network be replaced by fibre.

BT is dedicated to helping its customers thrive in a changing world. That means delivering communications, faster, quicker and cheaper than ever before. The debate about NGAs promoted by Ofcom, Government and other stakeholders is important and one that BT welcomes. However, it is important that the debate is about services not technology – services that customers want, that aid competitiveness, and that augment the position of the UK as a leader in communications.

The UK is a world leader in broadband in terms of availability and take-up and the broadband market is fast-moving, highly competitive and driven by the services customers want. The challenge to all industry players is to continue to innovate and meet customers' increasing expectations, which will be defined not by bandwidth or speed as ends in themselves, but in terms of the applications they want and need. Fibre will clearly play a part in this but so will other technologies. BT will be rolling out broadband at up to 24Mbit/s nationwide over copper from spring 2008 and other technologies will also have a role to play – including cable and wireless solutions from players other than BT. Fibre is already provided extensively to businesses in the UK. For the foreseeable future then there will be a 'mixed economy' of technologies and providers. It is also important to recognise that it is not just investment in the access network that is important – BT, through its 21CN programme, is making substantial investments to improve the ability of backhaul and core networks to carry faster broadband services.

Ofcom does recognise that next generation access can be delivered by a number of different technologies and architectures but for the purposes of this consultation document, it defines next generation access as '*broadband access services that are capable of delivering sustained bandwidths significantly in excess of those currently widely available using existing local access infrastructures or technologies*' and concentrates on the impacts on regulation and competition that may arise from the use of specific NGA technologies to upgrade the existing copper access networks. Indeed, the scope of the document is effectively narrowed to consideration of the implications of BT's copper network being upgraded through either Fibre-to-the-cabinet (FTTC) or Fibre-to-the-premises (FTTP) technologies. There is little consideration of the position of cable, although it is noted that Virgin Media is the other significant owner of underlying access infrastructure for the

mass market and its network covers around half of UK households. In responding to this consultation, BT will address the issues raised by Ofcom but, for the purposes of the wider public policy debate, NGAs need to be considered more broadly and in a technology-neutral manner.

International Comparisons

A feature of the NGA debate has been the use of international comparisons, highlighting those countries where there has been a greater level of fibre deployment (or announcements of proposed fibre deployment) than in the UK. It is important to understand the detail behind the announcements made as coverage is not always as extensive as is suggested. Ofcom also provides an analysis of a number of factors that combine to make the case for fibre more appealing in certain countries than in the UK. These include:

- Where there is a relatively underdeveloped multi-channel or pay TV market, or a strong incumbent cable operator (such as in the US), current generation access network owners may view NGA as an opportunity to generate additional revenues through IPTV services. This is not the case in the UK given the success of the Sky and Freeview platforms.
- In certain countries (such as the US, Belgium and the Netherlands), intense competition between LLU and cable has led incumbent cable operators to upgrade their networks.
- NGA deployment decisions may reflect specific geographic cost variations. For example, countries such as Japan have a high percentage of their infrastructure installed overhead, making it cheaper to upgrade, and have more people living in apartment blocks (half of households in South Korea compared to less than 10% in England and Wales), making FTTP (or 'fibre-to-the-building') relatively cheaper. There may also be some specific cost savings, where, for example, operators are able to realise savings by selling exchange buildings, as is the case with KPN in the Netherlands.
- In some countries, notably the US, poor quality copper or long local loops prevents exchanged based DSL speeds and quality matching those in the UK, providing a greater need to upgrade to fibre.
- In countries such as Japan and Korea there has been central government intervention and fibre deployments are part of the national industrial policy. In other countries such as Sweden and the Netherlands, local government or housing associations have traditionally played a role in municipal schemes.
- Regulatory forbearance (exclusivity) has also been a factor in incentivising certain incumbents to invest.

It can be seen then that there are a number of factors not present in the UK that have led to fibre deployments in certain other countries. It is also worth noting that where fibre has been deployed, there is generally no wholesale offering and in a number of cases, there is limited consumer choice.

It should be stressed that fibre deployment is starting to happen in the UK. BT is already building extensive fibre networks. Where business customers have

a commercial need for fibre BT has a suite of products already available. Some 120,000 UK businesses are already directly connected to fibre services. Through Openreach, BT already offers wholesale fibre-based access and backhaul services, and is further developing its portfolio. Openreach will be investing in FTTP on new build sites from mid 2008 onwards, starting with the Ebbsfleet development. The new house-building programme announced by the Government envisages some 3 million new homes: a substantial opportunity to develop a significant footprint of next generation homes. This development will give service providers the opportunity to see what the scale of demand might be and what the commercial model for more extensive deployment might look like. BT is also already gaining practical experience of FTTC in Northern Ireland and we continue to 'lab test' the various technologies.

At the same time, as already indicated, as part of its 21CN programme, BT will be rolling out broadband at up to 24Mbit/s nationwide over copper from spring 2008, giving around 50% of the population at least 10Mbit/s downstream. BT is also making substantial investments in backhaul and core networks to allow other providers to innovate and meet customer demand for higher performance broadband services. This contrasts with the situation in other countries where operators have chosen to invest in access networks without corresponding upgrades in backhaul and core.

As Ofcom notes, there is also the publicly-funded Digital Region FTTC initiative in South Yorkshire and Virgin Media has recently announced it will begin rolling out a service of up to 50Mbit/s to its customer base. Fibre is already provided to business customers by a number of providers in addition to BT.

These initiatives all indicate that, despite the lack of the specific factors that have triggered fibre investment in certain other countries, there is growing market-led interest and activity in the UK.

Market Demand

The early fibre deployments that are emerging in the UK will give the opportunity to assess the demand for higher bandwidth services (and consumers' propensity to pay for these) but BT agrees with Ofcom that, on the basis of current evidence, it is unclear that the majority of customers are demanding significantly higher bandwidths for broadband access. Ofcom rightly cites the current high levels of customer satisfaction with UK broadband services. Where there are issues raised, these are generally not related to the need for fibre networks; the NGA debate has been to some extent confused by concerns about the availability of current generation broadband services, including the need to tackle residual broadband 'not-spots' and 'not-enough-spots', where for a variety of reasons, the actual speed achieved may be significantly lower than the network's 'headline' speed. Fibre may in certain instances form part of the solution but this should not be confused with a demand for significant investment in NGAs.

Ofcom indicates the new potential applications that may require higher bandwidths. These are generally video-rich services, such as video-on-demand, increasingly popular with younger age-groups. However, BT agrees with Ofcom that there is significant uncertainty as to when and how bandwidth demands will increase to a point where NGAs are required to satisfy customer demand. This uncertainty was also highlighted by the Broadband Stakeholders' Group (BSG) in their recent report.

It is also important to recognise, as Ofcom does, that even as the demand for these new video-rich services does emerge, it is unclear the extent to which they will require fibre connections. Many of the video-based applications, including high-definition video on demand, can either be satisfied by current networks or will in the future be satisfied as broadband speeds over copper increase and compression techniques improve. It is our understanding that in the countries that have deployed fibre, consumers are generally still not using applications that require the very high bandwidths available.

Ofcom also correctly notes that in relation to the new services emerging, such as the BBC iPlayer, the most significant bottleneck or capacity constraint might have less to do with the access network and more to do with the backhaul or core networks. As indicated earlier, this is an area that is being proactively addressed by BT through its 21CN investment programme.

There may of course be applications emerging over the short to medium terms that really do require the very high bandwidths only fibre access networks can offer, such as peer-to-peer transfer of real-time HDTV files or the live relay of multiple HDTV broadcast channels. BT is keen to assess the demand for such applications and is always willing to engage with content and application owners to better understand potential network and bandwidth demands. However, in looking at potential demand, it needs to be recognised that some applications, particularly involving real time broadcasts, will always be delivered more efficiently over other platforms; hence, it may not be economic to dimension telecoms access networks on the basis that they will be the main distribution mechanism for television. It is important to emphasise that demand for services needs to be *effective* demand - i.e. accompanied by a willingness on the part of consumers to pay for the additional bandwidth (unless those applications are considered to provide sufficient social value to warrant public subsidy).

Finally, it should be noted that the needs of business are generally absent from the NGA debate, As indicated earlier, BT and other operators already provide fibre extensively to large businesses, but it is important to better understand future bandwidth requirements from all sectors of the business community, including SMEs and large Enterprises. Business needs are very different, in most cases, from household requirements and it will be important to ensure that capabilities are provided over NGAs to meet these requests.

Question 1 When do you consider it would be timely and efficient for next generation access investment to take place in the UK?

For the reasons set out above, BT generally supports Ofcom's view that there is currently significant uncertainty as to when and how bandwidth demands will increase to a point where next generation access investment (defined as large-scale investment in fibre access) is required to satisfy customer demand**.** The vast majority of users and applications work very well within today's bandwidths and plans are already in place to ensure that more complex and bandwidth-intensive applications can be used over the existing copper network. However, it is important to continue to understand developing consumer demand patterns; the early fibre deployments that are emerging in the UK will give the opportunity to assess the demand for higher bandwidth services. Removing the regulatory barriers to NGA investment would encourage the growth of these early deployments.

2. The regulatory challenges

Ofcom's approach

In its consultation document, Ofcom sets out its approach to regulating NGAs. In seeking to ensure that the right conditions are in place for timely and efficient market-led investment, Ofcom is particularly concerned to ensure that regulatory uncertainty is not a barrier to timely and efficient investment and hence that stakeholders understand the principles on which regulation will be based going forward. Ofcom's starting point is the set of principles laid out within its Strategic Review of Telecoms, which aim to:

i) promote competition at the deepest levels of infrastructure where it will be effective and sustainable;

ii) focus regulation to deliver equality of access beyond those levels;

iii) as soon as competitive conditions allow, withdraw from regulation at other levels;

iv) promote a favourable climate for efficient and timely investment and stimulate innovation, in particular by ensuring a consistent and transparent regulatory approach;

v) accommodate varying regulatory solutions for different products and where appropriate, different geographies;

vi) create scope for market entry that could, over time, remove economic bottlenecks; and

vii) 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.

We believe these principles are right for the NGA world, though the detailed nature of their application requires further consideration. The principles of competition based on equivalence, as underpinned by BT's Undertakings and the creation of Openreach, are serving the UK well and are helping to drive the UK success story in broadband. The challenge for Ofcom is to interpret these principles in a way that promotes rather than inhibits efficient and timely investment.

As Ofcom is aware, it is important that regulatory policy does not deter investment in new technology when market conditions are right and hence it may not be appropriate simply to roll-over the existing regulatory approach.

The approach that Ofcom adopts in relation to the wholesale access remedies required for ensuring competition is key, as is the approach taken to the migration from the existing regulatory obligations at the appropriate time. It is important that the regulatory environment gets the balance right between the

recognised need to protect and promote competition in the legacy copper world and the need to ensure there are sufficient incentives for investment in new, potentially replacement technology.

Ofcom identifies four regulatory challenges arising from NGA deployment:

- In advance of deployments, how does Ofcom ensure that there are the right conditions for timely and efficient investment in next generation access networks?
- Once next generation access investments have been made, how does Ofcom promote competition in the case where these networks are an enduring economic bottleneck?
- How should existing regulatory obligations and remedies evolve following next generation deployments?
- Following next generation access investments, how should policy address any prospective issues with respect to social inclusion and the digital divide?

In our view, these are the right questions to be asked and we set out our views as follows:

Principles for securing timely and efficient investment

Ofcom sets out three principles in relation to this objective:

- contestability
- reflecting risk in returns; and
- regulatory certainty

BT agrees that these principles are appropriate. We comment in the next section on how risk can be reflected and the need for certainty in terms of the regulatory framework facing NGA investors. We also comment in detail on contestability later in this submission in response to Ofcom's suggested NGA remedies. However, it is important, at the outset to be clear that a balance needs to be struck such that an 'open access' environment is created where as many parties as possible are able to offer competitive solutions, but that, at the same time, inappropriate regulatory remedies are not mandated which reduce the incentives to invest by either creating technological fragmentation which introduces cost and complexity for downstream CPs, or by damaging the economics of the most efficient wholesale products. It is also important to note that the deeper the level at which competition occurs, the higher is the total capital which needs to be expended (by multiple network providers) to deliver services to the same set of end customers, and there is an economic efficiency issue to be considered here. BT believes passionately that a wholesale model based on equivalence is fundamental to creating a vibrant, competitive market but careful consideration needs to be given to the best way to achieve this given the challenges of NGA economics.

Having said that these principles are relevant, the question has to be asked whether such an approach is sufficient in order to promote investment given the substantial amount of money required for NGA deployment. More

fundamentally, there may be the need for a new industry model if major NGA investment is to be encouraged.

The potential scale of NGA investment is daunting. In the absence of a proven commercial model, moving towards a UK NGA can only begin as incremental steps, each separately justifiable in themselves, which in time will, if applications emerge and value flows through to the access investor, build to a meaningful momentum. Such incremental beginnings are already visible: BT has made commitments in respect of new build sites and Virgin Media is extending the capabilities of its network. But the full benefits of NGAs are only realised if applications and services exploiting their capabilities emerge. That requires content owners to have confidence that they can address a growing customer base on similar terms and through common platforms and processes.

The implications of this for the form initial NGA regulation should take are profound. If, as seems likely, first deployments are limited and fragmentary, the issue arises of how those deployments can be made available to the content and application provider industry, such that a significant addressable customer base is generated, and opportunities for service innovation maximised. It is also important for consumer choice that individual consumers are not left out of the competitive marketplace, with first movers creating a vertically integrated 'lock-in' for all next generation services for a particular household or geography.

It follows that throughout the value chain, those building and those seeking to innovate and provide services on NGAs need to recognise their part in building towards a UK scale deployment. That means a common commitment to open wholesale access and a common commitment to open standards and platforms allowing downstream service, content and application providers and developers to engage on similar terms with all NGA deployments. It means equivalent availability of bottleneck assets, in a way that preserves and enhances customer experience, taking advantage of the next generation technologies.

This form of collaboration will not necessarily arise without the direction and support of regulators, and the creation of enabling industry fora. But without it the content industry will lack the scale of opportunity to build new services; and the virtuous circle of service innovation leading to improved returns on investment, leading to accelerated deployment, is stymied before it can begin. The vibrancy and benefits created by the current generation of industry structure will be lost.

Collaboration also relates to funding models. Just as content and application owners need access to the networks others build, so must they also be open to new commercial models which contribute to the costs of those networks. For example, some business models may lead to content owners or service providers supplementing the charge paid by a consumer for their broadband access where this would enable the provision of bandwidth intensive content.

Collaboration can also mean working together to ensure NGA deployment relates to areas of known and more certain demand. For example, service providers may be able to identify areas of intense demand and offer some form of security or commitment to encourage focussed network deployment. In addition, Regional Development Authorities, the Devolved Administrations or sub-regional economic partnerships may value and wish to pay for the contribution NGAs may make to local demand stimulation and investment. Where funds are available and state aid rules permit authorities may wish to contribute to the construction of duct and access networks in specific locations. In these circumstances the question will arise as to how such networks are to be managed and provided to all parties on a non-discriminatory basis. There may well be a collaborative role for Openreach to play in these circumstances. Collaboration also means better coordination between regulators, government, planning authorities and RDAs to remove barriers to NGA and enhance conditions, both nationally and locally, to encourage the market to develop.

Principles for promoting competition

Ofcom sets out three principles in relation to this objective:

- contestability
- maximising potential for innovation; and
- equivalence

As indicated above, BT fully endorses equivalence as one of the fundamental starting points for the development of a healthy competitive environment. It should not be assumed that this only applies to BT: we believe that anyone should be free to build NGA networks and that those who do so should be required to offer NGA products on a wholesale, equivalent basis.

The other two principles are closely interrelated. We support the aim of ensuring that wholesale products offer the greatest possible scope for innovation and competitive differentiation by CPs but, at the same time, we also agree with Ofcom that competition should be promoted at the deepest level where competition is likely to be *effective* and *sustainable*. This requires an understanding of the economics and practical issues relating to fibre technologies: this is discussed later in this document in response to Ofcom's proposed active and passive remedies.

BT supports Ofcom's support for experimentation and innovation. It is likely that both technical and commercial trialling will be needed in order to take forward potential technologies and business models. However, there may also be limitations to the extent that multiple types of competition can co-exist without damaging the economics of NGA investment for all players. As indicated above, one of the challenges is to realise the benefits of experimentation whilst avoiding technological fragmentation which can introduce a layer of cost and complexity for downstream CPs to the detriment of the services provided to consumers. In BT's view, it is important that downstream CPs always have access to end-users, regardless of the upstream provider, and solutions that create 'islands of exclusivity' need to be

avoided. Regardless of considerations of market power, Ofcom has a role in ensuring that there is open access and interoperability. Only then will the benefits of competition be fully realised for consumers and sufficient economies of scale be created to stimulate the development of downstream services and applications that fully utilise the higher bandwidths available.

Implications for existing regulation

Ofcom rightly gives consideration to the need to carefully manage the transition from current to NGA regulation. We comment on this aspect in more detail later in this document but would emphasise that we believe the principles of EoI as set out in BT's Undertakings are applicable to fibre as well as copper access bottlenecks. We do not believe that the UK functional separation model adversely affects investment; on the contrary, an active wholesale market for NGA should improve the prospects of networks being fully utilised and hence improve the economics of investment.

The key issues for BT in relation to the transition from existing regulation are the need to ensure that

a) disproportionate and inappropriate obligations, originally defined in relation to copper technology, are not imposed on fibre networks; and

b) there is no unreasonable requirement to maintain a copper network because of the requirement to support certain wholesale remedies.

We cover these aspects in more detail later but it is evident that there is a risk that the requirement to meet such obligations drives additional costs that may inhibit investment.

Digital Divide

BT agrees with Ofcom that it is premature to consider specific policies to address a future digital divide arising from NGA investment. There may be some circumstances where public funding is justified in certain rural areas, subject to Ofcom/BERR guidance and state aid rules, but in general, we agree that it is risky to seek to pre-empt commercial roll-out plans and anticipate future problems. Even if NGA commercial roll-out does not take place on a uniform, national basis, there is not necessarily a problem, providing that, for example, everyone has a reasonable level of bandwidth. In looking at the digital divide, we need to distinguish demands for NGA from the need to tackle residual broadband 'not-spots' where fibre may in certain instances form part of the solution. There are of course many dimensions to the digital divide apart from regional issues – age, income and education are all factors in the take-up and usage of broadband. We agree that more work needs to be done to understand the social value of NGA, and the extent to which it impacts on economic and social inclusion, before it is clear that a problem exists.

Question 2 Do you agree with the principles outlined for regulating next generation access?

For the reasons set out above, BT agrees that the principles outlined are appropriate for regulating NGAs. The challenge for Ofcom is to interpret these principles in a way that promotes rather than inhibits efficient and timely investment. Given the substantial amount of money required for NGA investment, there is, however, a question as to whether Ofcom's approach is sufficient to promote investment in NGAs, or whether a more proactive regulatory approach is required.

We believe we need a new, collaborative industry model if major NGA investment is to be realised - collaboration on the basis of supporting a wholesale market based on equal access, within a framework where all NGAs are available to all providers, and operate to common platforms and standards using open architecture in order to support service and application development and delivery.

3. Securing investment in next generation access

In the previous section, BT set out its views on Ofcom's suggested principles for regulating NGAs. In relation to the objective of securing timely and efficient investment, Ofcom articulates three principles – contestability; reflecting risk in returns; and regulatory certainty. We discuss these principles, and their practical application, in more detail below.

The role of contestability and competition in incentivising investment

Ofcom believes that ensuring an environment exists in which NGA investment is contestable – where other organisations other than the SMP network operator have the chance to make this investment when they are ready – is important in that it reduces the dependency on the SMP operator and their potential ability to block efficient investment by other parties.

BT does not disagree with the need to ensure contestability. Unlike incumbent operators in many other countries, we have made the commitment that where we offer NGA products these will be available on a wholesale, equivalent basis. We would aim to offer CPs the ability to invest and innovate on the basis of wholesale products that meet industry requirements. We believe that the wholesale model is a means of spreading risk to the extent that it enables the upstream provider (Openreach in the UK) to address a greater downstream market than if it solely served other parts of BT and BT's retail customers. However, the 'contestability' principle is not generally designed as a means of incentivising investment by the SMP network operator, and there is a risk, which Ofcom acknowledges, of wrongly-specified wholesale remedies actually acting as a disincentive, particularly if design or technology choices are mandated.

Risk sharing models

BT welcomes Ofcom's careful consideration of this complex area, and its acknowledgement that major new investment in NGA networks would represent a significant level of risk for an investor. We also welcome Ofcom's willingness to explore its potential role in removing any regulatory barriers which may impede efficient new investment. An appropriately structured pricing framework can provide incentives for innovation and efficiency if potential rewards are perceived to match or outperform the level of risk entailed.

Ofcom also recognises the practical problems in defining *ex ante*, the appropriate level of return and the possible negative outcomes of the regulation of prices (or even the potential for this regulation) 'chilling' efficient and timely investment. We very much agree with this analysis, and think it is particularly applicable to an NGA investment scenario, where relatively high levels of investment will be required for a sustained period and yet demand, cost and price of new services will remain very uncertain for some time to come. To add to this risk profile the strong chance that any 'over-

performance' would be removed by regulatory intervention would undoubtedly be a strong disincentive.

Regulatory certainty is an important element of the appropriate framework, and in particular the period for which any such regime might last for would be key, and, if not definable by dates alone, the trigger criteria, or milestones, which might be employed to provide such certainty. Ofcom does not address these types of issues in detail in the consultation document: their analysis in this area concentrates particularly on product pricing (and in particular Openreach's product pricing.) However, before that can be relevant, there is a need to consider the overarching framework which would apply.

Pricing models

In the consultation Ofcom investigate three possible pricing regimes which could be applied to new NGA products. The following sections provide our assessment of each of these:

Project Specific Risk Adjusted Cost of Capital

This is a form of traditional 'cost plus' regulation where the regulator sets wholesale prices. As suggested above, it is difficult at the current time with the current low level of NGA deployment in the UK to estimate an *ex ante* value for the risk associated with specific NGA investments, although perhaps in the long run it might be possible to calculate a robust number. At this stage, however, it is virtually impossible to perform such a calculation with any rigour. Long run costs are unknown and short run costs far exceed the price that any customer would be willing to pay. In addition any price premium calculated to reflect 'additional risk' and levied on the new technology without any reference to price elasticities is likely to make the demand for the service more uncertain rather than improving the commercial case and chance of customer take up.

In addition it is difficult to see how this approach would incentivise service innovation, at precisely the time when experimentation and collaborative sharing of ideas should be encouraged. This might lead to an outcome where the regulator is heavily involved in specifying future product capability.

Non-Discriminatory and Equivalent Access

This option would allow the owner of access infrastructure to set access terms, so long as these were non-discriminatory and provided on an equivalent basis to all third parties, including its own downstream divisions. In our view, this approach has some very strong arguments in its favour when considering the needs of the regulator, investor, competitors and end-users. It is particularly suitable for use where costs are very uncertain, product specifications are likely to change and evolve rapidly and the key concern centres on maintaining a fair downstream competitive environment. It removes both the need to calculate new platform costs and the requirement to derive and impose detailed regulatory cost apportionment rules for unknown

numbers of potential future product sets. Furthermore, it prevents discrimination in favour of the platform owner's downstream CP which can help to sustain and stimulate a competitive downstream market and consequent 'buyer' price pressure on the upstream supplier. BT believes that this downward pressure would allay the fears of margin squeeze that Ofcom suggest.

For these reasons rigorous non-discrimination and equivalence provisions may in their own right be a sufficiently strong mechanism to consider for the regulation of a range of next generation broadband services. Costs and product specifications are unknown at this stage and will certainly be subject to rapid change and for NGA broadband services there will be significant price pressure on CPs for some time to come as new services are compared in price/performance terms to existing services. Given this end-user price expectation the most powerful and easily achievable regulatory objective might be to ensure a level playing field for some time to come to stimulate downstream competition. Non-discriminatory and equivalent access terms can meet this need. Other approaches may also be able to achieve this outcome but it is difficult to see, at this stage, how they might operate for new next generation services without significant additional regulatory involvement and a dependency on detailed cost information. The non-discriminatory and equivalent access regime also aligns the ownership of pricing decisions with the firm facing the risk, rather than a third party.

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Anchor Product Pricing

Ofcom sees anchor product regulation as an alternative to the two general approaches described above. This approach would involve offering one or more products on the next generation access network that replicate existing offerings to end users in terms of price and service for a period of time. This would be particularly important where existing services are no longer available e.g. where there is no parallel copper network. The approach has the following characteristics:

- regulated wholesale anchor products are specified such that end users are expected to face the same (or similar) price and service that was available over copper, for those services that remain dependent on the new bottleneck;

- prices are not cost based since those prices that are controlled are set on the basis of prices on the previous platform (with a different cost structure);

- outside of these regulated anchor products, prices for higher performance or new service offerings would not be subject to regulation through price controls (or a similar mechanism). However, the asset owner would be required to provide them on the basis of equivalence.

In our view this approach has many of the advantages of non-discriminatory and equivalent pricing over a cost based approach at this stage in the NGA

investment cycle. Additional complexity is added to the framework by the attempt to provide an additional level of end-user protection by matching the price and performance of a service on the legacy platform to a similar point on the next generation platform, but we do recognise that this is something that a regulator would want to investigate further. However, it is important to consider exactly what customer expectations are and what the primary objective of the pricing regulation is intended to be.

If an access network only carried voice services then there would be little real debate about NGA. A network operator would invest in fibre access to the extent that economics dictated and end-users would not expect to be charged more or receive a poorer quality service because of it. Hence the anchor product concept might work well for voice because of the many similar service characteristics between the platforms. Fibre would be substituted to the extent that economics would allow and an operator would be incentivised to make rational investment choices to increase their return.

Also, for voice, we should consider what legal ’protection’ a consumer has in a legacy network situation (a copper line). The USO provides that they can reasonably demand a connection to the public telephone network at a fixed location, and that the connection should be capable of providing functional internet access (FIA) at a minimum capability of 28.8 kbits/s. This further ‘anchors’ the expectation of the end-user.

For broadband the situation is different. There is no simple broadband product which fulfils the benchmarking task as well as WLR does for wholesale voice services. NGAs, by their very nature, provide capability that copper access networks do not, and it is therefore hard to match exactly attributes and price. A reading of ‘average’ national broadband speeds from the legacy network as the logical benchmark for next generation broadband investment, is a one dimensional analysis of the problem and misses many of the fundamental issues underpinning the current debate on NGA i.e. that NGA investment can ’fix’ the performance of the copper network in overlay scenarios and bypass the limitations completely for new build deployments, whilst also future proofing the network for investor, CP, end-user and the UK economy. It almost certainly requires a broader analysis than matching the average speed and price to create a worthwhile measure of an efficient infrastructure investment.

In particular for new build sites we do not have to follow the path of investing in copper and then upgrading - we have a choice to make a better quality broadband-based investment. By introducing the fibre based products we bypass the evolution of broadband taking place in the copper network and set a new benchmark and price for a new access network which is built to fully support the broadband requirements of current and future users. For new sites there will be no ’not-spots’, no random variability and clear product performance and price points. Therefore the pricing regime must allow for the investor to receive a ‘fair’ price for the service provided, one that allows a chance of getting a sufficient return on capital for the construction of a purpose built broadband platform, and a payback period which is acceptable

to the capital markets for the risk incurred. If pricing is set purely in reference to today's copper pricing, it may act as a considerable barrier to investment. (There is an interesting contrast here with Ofcom's position on 3G mobile termination where consumers pay more to terminate their calls on a 3G network that offers no additional benefit)

Anchor pricing may, however, prove not to be effective in providing investors with a reasonable prospect of recovering costs. The price of the anchor product is set with reference to the costs of existing technologies and therefore does not itself recover the costs of NGA deployment. We do not know at this stage whether there will be sufficient customers for higher capacity products, willing to pay an adequate premium, for the gap between costs and income to be bridged.

The conclusion that BT draws from the above analysis is that it may be possible for an anchor pricing approach to work successfully for NGA products but that it would be critically important that the overall business case for the investment had a realistic chance of being achievable. In particular, the price and performance of the anchor products, although primarily chosen to protect end-users, must not compromise the ability of the investor to upsell higher value products. The approach undoubtedly introduces a high level of risk for the investor and for large upfront investments of the sort NGA might entail, there is potentially significant financial exposure. This is different to a non-discrimination and equivalent access regime where all pricing decisions are made by the firm facing the risk, rather than a third party. Under both scenarios however there remains substantial market risk for the investor if they get the product and price wrong, and substantial incentive to make the price attractive for downstream CPs and ultimately consumers.

For anchor pricing to truly work, however, sensible collaboration between relevant parties must occur. As cost orientation is not, by definition, the approach to pricing, a commercial agreement that is in the interest of both parties must be reached. However the true benefits of this regime is the premium it places on all parties to innovate and discover whether there is an end user willingness to pay for particular products. Even if just for a limited period, this could be a valuable opportunity for all parties.

It is important to note that BT has already recognised and accepted that the principles of equivalence should apply for new build pricing and that all Openreach products will be supplied on an EoI basis.

Other risk-sharing models

As can be seen from the discussion above, there are a range of detailed issues to be explored in relation to the various regulatory pricing options. Pricing clearly has a role to play in incentivising investment but is unlikely to provide the full answer, not least because the ability of the upstream provider to fully recover risk over a reasonable time-frame is likely to be constrained, particularly in the early years of NGA roll-out by consumers' (and hence downstream CPs') willingness to pay.

As indicated in the previous section, BT believes that there is likely to be a need for new models, involving industry collaboration, if large scale NGA investment is to take place. A practical example of this is a demand-trigger model which could be introduced as part of a targeted FTTC deployment to enable investment risks to be shared by CPs. Such a demand-led model might also be appropriate for certain regional deployments in partnership with RDAs. BT is actively investigating such models.

Regulatory Certainty

As indicated above, BT believes that certainty is an important element of the regulatory framework, and in particular the period for which any pricing regime might last for is a key consideration. This is the case for the control of individual prices, but equally it is important to understand how the pricing of one regulated product affects others and to ensure that potential investors have the right incentives over time. This potentially includes the relationship between current and future wholesale prices over copper and fibre. It is important that the regulatory regime does not build in or perpetuate false signals to the market.

Given the long pay-back periods that will be associated with large-scale fibre investment, further consideration needs to be given to the relationship between the need for regulatory certainty over the medium-term and the periodic market reviews which are the vehicle for imposing and reviewing regulatory remedies, including price controls. Investors in NGAs require a secure and certain regulatory framework over the medium term; it is important to know what services will be required and under what regulatory pricing rules, so business cases can be planned with certainty

Forbearance

BT agrees with Ofcom in believing that equivalence, rather than forbearance, is the right approach to regulating enduring access bottlenecks. As Ofcom indicates, there is a particular risk of allowing positions of market power to emerge upstream to the detriment of competition at other points in the telecoms value chain. As Ofcom states, this principle applies equally to new investments as it does to legacy networks. BT equally believes that this should apply to all owners of access infrastructure, including on a regional/local basis. Local pockets of exclusivity that preclude downstream competition must not be allowed to develop.

Question 3 How should Ofcom reflect risk in regulated access terms?

As discussed above, BT agrees with Ofcom as to the importance of reflecting risk if NGA investment is to take place. Traditional ‘cost plus’ regulation suffers from the difficulty of setting *ex ante* rates of return. BT believes there are merits in both the anchor product pricing approach and in allowing upstream prices to be set by the asset owner on a non-discriminatory and equivalent basis, but further work is needed to address practical

implementation issues. However, pricing models are unlikely to provide the full answer, not least because the ability of the upstream provider to fully recover risk over a reasonable time-frame is likely to be constrained, particularly in the early years of NGA roll-out by consumers' willingness to pay (and hence that of downstream CPs). BT believes that there is likely to be a need for new models, involving industry collaboration, if large scale NGA investment is to take place. Regulatory certainty, including the length of time any regulatory framework should last, is also of key importance.

4. Promoting competition in next generation access

BT broadly agrees with the principles which Ofcom sets out, namely contestability, the need to maximise the potential for innovation, equivalence, reflecting risk in investment returns and the need for regulatory certainty. We believe that there should be effective competition both at the NGA transport layer (regardless of who makes the initial investment), and in the use of that NGA infrastructure for delivery of service.

The NGA market is clearly in its infancy, but the potential for it to grow, particularly in new-build developments is expected to be significant. It is clearly important that new technology in a new market is not stifled by over-regulation early on, and BT welcomes the discussion of the options which are proposed to achieve growth of industry investment in NGA. A key test of effectiveness of competition should be whether or not the approach enables open competition between a wide range of service providers, or whether it is closed to competition, perhaps because the investment bar is set too high for many.

BT is one of a number of companies who could invest in NGA, and is also a service provider. We would therefore welcome a symmetrical approach to regulation. Incumbency is assumed in Ofcom's analysis but for new build scenarios the initial investor may not necessarily be BT. What is important (for the success of a capital-efficient deployment of NGA in the UK as a whole) is that whoever makes the initial investment in a given geography, a clear and open non-discriminatory and equivalent approach is taken from day one, and that all service providers have access to the facilities provided. This has not always been the case in new builds constructed since competition was introduced; those households affected are denied any competitive choice.

Ofcom identifies two principal forms of NGA deployment which are possible, namely FTTC and FTTP. We note, however, that other players in the market are also talking about higher bandwidth radio solutions (in particular UK Broadband and Freedom4) while announcements have been made by Virgin Media about their DOCSIS 3 technology which also appears to offer significantly higher bandwidths. We believe it would be inappropriate to ignore these developments.

Furthermore we appreciate the distinction which Ofcom is seeking to draw between active and passive inputs to competition and the particular challenge to identify an appropriate proxy for LLU in a fibre world.

Access to passive infrastructure – the theory

BT therefore recognises that Ofcom must examine both passive and active options for providing equivalent, open access to communications providers and service providers alike. The choice will ultimately be driven by both market demand for access to bandwidth, and the availability of capital to invest. Active options enable many service providers to provide service at a very low entry cost, resulting in a large number of players in the market. Passive options however require a more capital intensive investment, and therefore fewer players can act in the market, however, they may have more flexibility to differentiate themselves – both in terms of their costs and the

functionality they offer to end users. Hence although passive options may appear to be more flexible, they could actually be less open for the wider set of potential service providers to exploit than would an active option.

Access to passive infrastructure (ducts, copper sub-loops, and unlit fibre) has theoretical benefits to competition. Were such assets to be readily and affordably available, competition would suffer no constraint or limitation from the technology choices of the supplier.

In practice however, such access is fraught with difficulty. Spare duct capacity is frequently limited or absent (particularly fibre-ready duct). The economics of sub-loop unbundling seem daunting, and unlikely to support multiple operators. Furthermore, there is no surplus of installed access fibre to be made available unlit. Obligations to make unlit fibre available would amount to obligations to make capital investments rather than to provide access to existing facilities. This is tantamount to utility style intervention and regulation of the type Ofcom has to date rejected.

But there is a more damaging consequence of a regime based on access to passive infrastructure. Such an obligation changes the risk profile of investment in active NGA. It raises the barrier to investment in fibre networks for lit wholesale and retail services, since such investments could become stranded assets when substituted for by selective deployment of services based on passive products, which would inevitably focus on the densest concentrations of customers and the most profitable of users.

Of the signals regulation could send to investors considering investment in NGA, probably the most damaging is a message that a world is favoured where the returns available on an NGA infrastructure are secure at neither the retail nor wholesale service levels, but only at the level of civil engineering costs.

Duct sharing has been a topic of regulatory interest since the very earliest days of liberalisation and BT notes the growing interest in this area now. It is clear why this should be the case given that it is well known that duct build or the cost of civil infrastructure may be expected to account for some 70% of build costs. Furthermore, on the face of it, the incumbent already has access to this valuable resource. However, Ofcom itself highlights the practical issues, including the extent to which, in the existing duct network, there are likely to be issues of records together with quality to be considered. Ofcom notes that these would not be present in a new build environment and hence draws a distinction between existing infrastructure and new build. We understand that this subject will be given greater focus in Ofcom's forthcoming consultation on new build sites, expected early in the New Year, and we will address the specific issues relating to new build in our response to that document.

It is also worth emphasising that while the provision of dark fibre is often considered as a possible alternative to duct sharing as a passive remedy, the fact is that duct sharing is in some measure a *prerequisite* for this. Once

control of fibre in a duct is relinquished to a third party (i.e. is being run by someone other than the original network infrastructure provider) that third party clearly has a ‘presence’ in that duct and so a system of rules and guidance would need to be devised and agreed to ensure appropriate controls were in place, to safeguard engineers, and to clearly identify roles and liabilities. The requirements could span a huge range from the relatively simple to much higher levels of sophistication, related to the nature of the provision requirements.

In considering the ‘active’ versus ‘passive’ debate, we believe that while this is a helpful, and in many cases appropriate distinction, we are more inclined to the view that there is in fact a spectrum of variation, whereas Ofcom draws a hard and fast line. For example the proposed Openreach Generic Ethernet Access (GEA) product, which Ofcom would categorise as ‘active’ (since it involves electronics), only provides a basic packet transport, leaving considerable margin for innovation by an alternative provider. In fact the GEA product could be described as a system for imposing the minimum set of rules required to prevent ‘signalling chaos’ and an inability to differentiate the signals of different carriers. It could also be described as a logical, or virtual, separation of systems; one which separates signals (opto) electronically rather than physically as would happen with two parallel networks in a shared duct system.

Conversely, whereas duct-sharing is portrayed as passive, as Ofcom acknowledges in A8.5 there is a level of constraint even with shared ducts imposed by the duct architecture itself (which in fact will be quite specific to the types of network chosen). In addition, a system of rules would need to be developed to ensure the integrity and coherence of the networks within those ducts. We would therefore suggest that the development of GEA may offer greater flexibility with lower barriers to entry than may duct sharing. It is important that we assess both the scenarios where investment might be maximised as well as less attractive demographics or geographies in order that regulation itself does not create a digital divide by increasing average costs due to multiple regulatory interventions in the value chain.

It is also worth noting the position regarding recent duct sharing announcements elsewhere in Europe which have often been misreported. In France and other member states, the principle of duct sharing both voluntarily, and as a remedy, is mostly impractical, geographically limited and designed to avoid offering more appropriate wholesale access products, typically those required by other CPs. Recent developments in France indicate that duct sharing availability will be limited to10 key cities, which have available space and in some cases only where copper infrastructure is removed. Whilst these offerings could be seen as key enablers of infrastructure competition they are typically offered in environments where effective regulated wholesale access is not made available and as an NRA response to requests for functional separation

Practical deployment issues

It is critical then that such a significant investment in national infrastructure should be done efficiently, and in a way which benefits the consumer community as a whole but without jeopardising the business models of the infrastructure or service providers

This potentially challenges the view that effective competition is achieved by allowing competition at the *deepest* level possible, leading to the conclusion that it is best achieved by allowing competition at the *most efficient* level – in other words, the deepest level where competition is likely to be *effective* and *sustainable*. Mandating access remedies at the deepest level may not lead to effective competition because the number of providers who can take advantage of the opportunity may fall short of that required to support a competitive market. The combination of high fixed costs and low variable costs supports the view that early movers are likely to secure significant first mover advantages and potentially 'shut out' other investors.

It is important that regulation does not introduce a layer of additional costs and complexity through insisting on a multiplicity of solutions. Neither should any regulatory solutions preclude technological evolution, such as long range GPON; regulatory remedies will need to be responsive to technological changes which may affect business and competition models.

We look now at the two most likely wireline technologies to be used for NGA, namely GPON (for FTTP) and VDSL from the cabinet (for FTTC). This discussion highlights the practical issues relating to passive and active access options. (Note that DOCSIS technology is not considered here as BT is not best-placed to provide insight on this).

FTTP

GPON builds on a physical, passive shared medium, and it is this fact which (perhaps ironically) makes it difficult to share between SPs at the physical layer. The point to multipoint nature of a PON means that it is not possible to provide a separate, dedicated physical link to each customer. Therefore only one SP can put transmission equipment on any given PON. With GPON in the architecture deployed at Ebbsfleet, if there were to be infrastructure unbundling then this would be with a granularity of 32 (predetermined) end-users, who would then be unable to switch SP. Although it would be possible for future generation PONs to be shared at a deeper physical layer if multiple wavelengths were used, with each SP having their own wavelength, currently such solutions are very expensive, non-standardised and could be complicated from the planning and provisioning perspective.

As Ofcom indicates at paragraph 6.57 this argues for a more active approach in the case of GPON, using Ethernet as the means of product presentation. However, in our view, GPON, deployed with a GEA provides an interesting bridge between the active and passive options. GPON opto-electronics provide an interface to the underlying transport on the PON, and basic policing to ensure any QoS rules are enforced. This enables the GPON to

provide an open transport mechanism which in turn allows the service provider to provide a range of services. This, overlaid with the GEA solution proposed by Openreach, does little more than convert the electrical input and output signals into optical signals on the PON, and manages prioritisation of appropriately marked traffic within a Service Level Guarantee. This provides the foundation for a very open approach where the network provider offers open, functional, interfaces to the service provider.

Thus the GEA product will enable SPs to exploit the transport paths which are formed, and give them significant flexibility to innovate with QoS, VPN overlays etc, in addition to the ability to innovate at voice and application levels. This open approach therefore gives many of the benefits of a passive approach, namely efficient economics and the ability for SPs to overlay their own differentiating features.

It should be noted that a more passive approach is also likely to create far more interventions in the network than our suggested approach, where changes will be managed almost entirely without manual intervention, once the network is installed and handover points have been established with service providers. Passive models could drive an increased number of interventions - both for provision of service and repair - and these have the potential to introduce more faults into the network, and are likely to increase the operational cost. Furthermore, while Active MDFs have started to become a more serious option in the copper network (due to the demands of LLU, and advances in the technology) there is no realistic prospect of a low-cost optical equivalent. Optical switching is likely to remain an area of highly specialised core-network equipment, until and unless a demand arises in the access network.

FTTC

Sub-loop unbundling (SLU) is the passive access option for FTTC. As we indicated in our response to the earlier consultation, this is fraught with a number of practical issues, many of which are similar to those of duct sharing (space, power, inventory, security). A key concern must however be the economics of SLU and the impact on the market. Given the high level of investment required by an operator at cabinet level, this is not a step to be taken lightly. An operator will need to be convinced that they can achieve a reasonable market share at a particular cabinet (which typically contains 300-350 lines). However operators are all likely to identify the same cabinets as potential targets, thus diluting the incentive. For example, if four large operators are each chasing the ~50% of the customers at that cabinet who constitute the broadband population they can only each achieve 12.5% or ~40 customers. However, the investment will be large: power, space, equipment, and ventilation will need to be provided by each SP, as would SP-dedicated backhaul. These factors tend to indicate that cabinet level unbundling may not lead to effective competition; because of the high fixed cost of unbundling a cabinet, it is likely that SLU may only be economic for one or two SPs at each cabinet.

It should also be noted that BT was obliged to provide unbundling at the cabinet in 2000 by Oftel, yet, except for a few trials, very little interest has been shown in the product to date. There are a number of reasons for this, but primarily it is one of scale and economics. For example, a major UK operator (and Openreach customer) has estimated that the unit cost of delivery of service via cabinet level SLU is approximately four times that of exchange based LLU. In addition, when compared to the roll-out plans of exchange based LLU operators today, the challenge facing potential SLUOs looks daunting.

Nevertheless, we are positively engaged with the OTA2 in examining the potential viability of SLU. We would expect any developments to support such a service to be in proportion to the requirement for it by Openreach customers. Furthermore it must be taken as a central premise that in the event that any such developments are recommended, the service must comply with the requirements of the ANFP which is necessarily designed to protect the services being provided over copper cables in the cabinet from either another SLU operator or from the exchange.

As we also indicated in our March response BT does not view a 'multiple SLUO' model as one which supports competition at the deepest sustainable level of investment in NGA networks. In our opinion, the creation of an EOI "layer 2" product which is able to benefit from reduced engineering costs through aggregation of multiple CP bandwidth requirements probably offers the best opportunity for efficient and sustainable investment in an NGA network. Such a product would also represent a natural development of the competition model which exists today.

It would be more efficient (in terms of users served per quantity of capital deployed) if one provider were to invest in the infrastructure and then offer access to that investment to other operators on a non-discriminatory and equivalent basis. This takes us to an active model rather than a passive one. We believe that this active model for FTTC would be very similar (in terms of interfaces, processes, and to an extent bandwidths offered) to the proposed FTTP model (GEA / ALA). In particular, the product offered on equivalent terms would be Ethernet access to a number of logical connection points, which are likely to coincide with those offered for FTTP. This would reduce the additional effort required by a service provider to develop and deliver a product whilst still enabling them to differentiate as outlined above for FTTP in the provision of services to end users. A common approach to interfacing has the additional benefit of unifying the market over a mix of access technologies. Furthermore, such a solution is likely to be more flexible in the event that in the future Long Range PONs (LRPON) are developed and become the technology of choice.

It is important to note that although, as indicated above, BT is committed to continue to offer SLU as a passive FTTC option, it would not be economic or practical to provide this as an EOI input into the active FTTC offering; we welcome Ofcom's provisional conclusion that it would not be appropriate to mandate this.

Conclusions: the advantages of the Active Line Access approach

BT agrees with Ofcom's analysis that Ethernet is a suitable technology for the provision of an Active Line Access (ALA) approach. The proposed GEA product from Openreach has been shared with downstream customers in specific consultations and Openreach are committed to continuing this active engagement going forward. The GEA product provides access to service providers via a simple Ethernet handover, minimising the investment necessary by them. The provision of Ethernet as the basic transport enables flexibility for service providers both at Layer 2 and Layer 3.

At Layer 2 the service provider can use VLAN tagging and/or priority tags, for example to build specific VPNs, or to separate traffic types for different services. The priority tags can be used to enable the services to have the appropriate relative priority

At Layer 3, services such as multicast, IP QoS or VPNs can be overlaid transparently on the ALA infrastructure which will be provided by Openreach. This flexibility enables SPs to build a range of services appropriate to their own market – whether these are business VPN products, voice and multimedia services, IP TV or very simple high-speed web-access products. The SP then has the choice of how to offer these services to end users, and can therefore differentiate itself accordingly.

Given the political desire for the UK as a whole to remain competitive with other nations, it is necessary to look for the most efficient solution in terms of capital deployed. We believe this to be a primarily active solution, with open non-discriminatory and equivalent access to all on a symmetric basis, regardless of who actually makes the capital investment. We also recognise that where multiple players wish to deploy a capital-intensive solution (for competitive reasons) this should be enabled by the regulatory environment.

Question 4 Do you agree with the need for both passive and active access remedies to promote competition?

BT understands Ofcom's rationale for exploring the potential both passive and active access remedies. We agree with Ofcom that there are practical limitations which apply to passive FTTP options and we do not believe that the economics of sub-loop unbundling, the FTTC passive solution, will allow that to be an effective competitive solution. We believe that an active, Ethernet-based, remedy such as the proposed Openreach GEA product, offers the appropriate economic and technical capabilities.

5. The case for direct intervention in next generation access investment

When Ofcom considers the case for direct intervention in NGA investment, it looks as to whether there is a need for a regulatory or public policy approach to NGA which departs from the principle of trying to create the conditions for efficient and timely investment by the market. Ofcom believes that for a more interventionist approach to be adopted, there would need to be strong evidence that a market-based approach to investment would for some reason deliver the benefits of NGA to society or to the economy inefficiently late.

Ofcom's starting point is that the social value derived from NGA investment is as yet unproven. BT agrees that this is the case based on evidence of the existing applications in the market that would require very high bandwidths, including evidence from those countries that have already deployed fibre networks. However, there is insufficient empirical evidence at this stage and there is always a danger in basing decisions on consumers' current understanding of future technologies that have not yet been made available to them. There has also been a focus on entertainment, such as video-based and gaming applications, and less understanding, in particular of applications that might meet business needs and hence lead to increase in productivity. BT therefore welcomes the work being undertaken by the BSG to better understand the potential public value of NGA investments. The UK government, the Devolved Administrations and the RDAs all have an important role in quantifying this public value, as does the business community.

On the basis that the public value of NGA investment is as yet unproven, Ofcom concludes that there is limited risk in the UK investing later than other countries in NGAs, indeed there might even be advantages of not being a 'first mover' in terms of learning about technologies and practical deployment issues from other countries. The difficulty with this is that the lead times for NGA deployments are likely to be long and the size of investments needed are such that agreement is needed at an early stage as to what is required to ensure NGA investment does take place at the appropriate time.

Ofcom concentrates on what it sees as possible direct regulatory interventions which it could make in order to incentivise operators to make this investment. These range from explicitly guaranteeing investors a high price for NGA services to models which look at the pricing of all current and next generation services, including utility-style regulation models which are designed more explicitly to reward investment by looking at the returns earned across a range of services over a an agreed (usually medium-term) period. In our view, Ofcom too readily dismisses consideration of these on the basis that they will distort incentives to invest. BT believes it is important to distinguish between an interventionist regulatory regime designed to specifically engineer fibre investment and the need to ensure that the regulatory regime is not a barrier to new investment.

It is important to ensure that there is no artificial 'disincentive' to investment in new technology or services built into the existing regulatory regime. BT

recognises the need to understand the impact of any regulatory changes on end consumer prices (and indeed, as indicated in the previous section, we clearly recognise consumers' willingness to pay as a factor in considering regulatory pricing models); however, it is also important that false signals are not sent to the market in terms of the relative costs of current and next generation access services. If the prices of current generation wholesale services are set too low and do not cover costs plus the required return, NGA investment may not happen at the appropriate time. Ensuring a coherent set of prices and margins across current and next generation access services is important if incentives to invest in and use copper and fibre-based services are to evolve. Similarly, as discussed in the next section, the regulatory regime needs to allow for a market-led transition to fibre-based services at the appropriate time and this should not be hindered by the need to maintain and support inappropriate and costly legacy regulation The need for regulatory certainty over a reasonable period is also a prerequisite for an NGA investor; communications services may not appear to be utilities but the amount of capital required for NGA investment is similar if not greater than that spent by utilities in their major improvement programmes.

As set out earlier in this response, BT believes that the scale of NGA investment required is likely to require new, collaborative business models across industry. Ofcom and government both have a role to play in facilitating industry-wide discussions going forward.

BT agrees with Ofcom that there is currently no general case for direct public intervention in NGA investment. The public sector should be looking at ways in which it can encourage the market to provide rather than seeking to deliver such services itself. Where this has been considered it has usually led to a reduction in commercial activity and also the public sector has little record of being a successful provider and wholesaler of telecoms infrastructure.

However, there may be a case for funding by RDAs, sub-regional economic partnerships or local authorities in certain regions, subject to those meeting Ofcom/BERR and state aid guidelines. Such local initiatives potentially offer the opportunity to increase the UK fibre footprint and allow some technical and commercial trialling. However, we would not want to encourage inappropriate uses of public money nor see a patchwork of different networks, built on different technologies, emerging. Where funds are available, authorities may wish to contribute to the construction of duct and access networks in specific locations. In these circumstances the question will arise as to how such networks are to be managed and provided to all parties on a non-discriminatory and equivalent basis. There may well be a collaborative role for Openreach to play in these circumstances. RDAs and other bodies may also have a role in local demand stimulation.

There is also a role for collaboration and better coordination between regulators, government, planning authorities and RDAs to remove other barriers to NGA investment and deployment, such as planning and rating issues, and generally enhance conditions, both nationally and locally, to encourage the market to develop.

Question 5 Do you consider there to be a role of direct regulatory or public policy intervention to create artificial incentives for earlier investment in next generation access?

BT agrees with Ofcom that the public value arising from NGAs is not yet clear. However, given the lead times and scale of NGA investment, it is important that consideration is given now to what is required to ensure that market-led investment can take place at the appropriate time. There is a need to ensure that there is no artificial 'disincentive' to investment in new technology or services built into the existing regulatory regime, particularly that false signals are not sent to the market in terms of the relative costs of current and next generation access services.

BT believes that the scale of NGA investment required is likely to require new, collaborative business models across industry, which will also include regulators, government, planning authorities and RDAs. Ofcom and government both have a role to play in facilitating discussions going forward.

BT agrees with Ofcom that there is currently no case for direct public intervention in NGA investment. However, there may be a case for funding by RDAs, the Devolved Administrations or local authorities in certain regions, subject to those meeting Ofcom/BERR and state aid guidelines.

6. Implications for existing regulation

It is important to consider, as Ofcom rightly acknowledges, the relationship between existing regulation and the regulatory environment that might be applicable to next generation access and specifically fibre technologies. BT has current regulatory obligations which are formulated in a technologically-neutral way but, in practice, the definitions of these requirements, which are grounded in the underlying European directives, do however reflect copper as the delivery mechanism. – for example, LLU. There is therefore a need to understand how these current obligations should be interpreted in relation to fibre networks and, to the extent that they remain relevant, how they can be satisfactorily discharged over fibre. A sensible and managed transition from the existing regulatory framework is key if NGA investment is going to take place at the appropriate time.

Market definitions and the Undertakings

Market definitions are important given that wholesale remedies are dependent on market reviews and findings of SMP under the EU framework. Since Ofcom's consultation document was published, the Commission has published its Recommendation on Relevant Markets. Market 11 (Wholesale Local Access) and Market 12 (Wholesale Broadband Access) have been redefined on a technology-neutral basis as Markets 4 and 5 respectively. BT currently expects the NGA wholesale products to be within the scope of these markets but the position needs to be kept under review as NGA deployments emerge and the nature of products becomes clearer. It may be that there is a blurring of the boundaries between Markets 4 and 5, particularly to accommodate the GEA product. Additionally, while BT does not currently envisage the need for a new market for higher bandwidth services, this again should be kept under review if fibre does introduce a sufficient break in the chain of substitution.

As NGA remedies will be implemented via market reviews, it is important that Ofcom gives industry clarity on timing issues, particularly in relation to those market reviews (such as Wholesale Broadband Access) currently under way. It is also important to understand how Ofcom will deal with the assessment of SMP going forward; it would be expected that all owners of NGA assets would have SMP (and hence should have wholesale access obligations) and this needs to be considered in terms of market definitions. Finally, given the need for a stable and predictable regulatory framework given the size of potential NGA investments, Ofcom needs to give consideration to the length of time over which it can give regulatory certainty within market reviews.

Ofcom also needs to give further consideration as to the applicability of BT's Universal Service Obligation in a fibre world, particularly in situations where BT may not be the owner of the access infrastructure.

We agree with Ofcom that the Undertakings remain relevant. BT has already committed that NGA products will be supplied by Openreach on an EoI basis.

Migration from existing regulation

In looking at the migration from existing regulation, a key issue for Ofcom and for competitors will be the position of past investments made in the copper network when network operators upgrade to fibre. LLU operators (LLUOs), for example, have invested significant amounts in rolling out their networks. As Ofcom says, the actual transition issues will depend on the technology deployed and a variety of other factors. Where fibre is provided on 'greenfield' sites there are no legacy investments. For fibre to the cabinet (FTTC) deployments in 'brownfield' sites, it is likely to prove more economic to leave copper in place alongside fibre, which will, for example, allow LLU operators to continue offering their existing services. However, were FTTP to be rolled out in brownfield' sites, the costs of maintaining parallel copper and fibre networks would be prohibitive and have a significant negative impact on any investment case.

BT welcomes the fact that Ofcom recognises that its role is not to protect any organisation's investments against new technology developments that supersede current market propositions. We understand that Ofcom believes it is appropriate to protect operators from the regulatory risk of products being withdrawn in an inappropriate timescale. However, it should be emphasised that this is an issue of *when*, rather than *if*, existing regulation should be updated, withdrawn or replaced – for example, the removal of the obligation to provide LLU - with the specific timing of such decisions to be made on a case-by-case basis, taking into account the prevailing market environment and the impact on consumers and competition.

BT believes that any transition to a fibre-only network should be reasonably short on the basis that appropriate downstream competitive services, both fixed voice and broadband (even if they are different to today's), can be delivered over fibre and that there is therefore no basis for the existing copper network being retained once an alternative fibre network is in place. It is important that it is recognised that the exact same wholesale services do not need to be provided, subject to the underlying objectives of network competition being met and there being clear transparency to customers as to the choices available. As Ofcom indicates, this is a discussion that is starting to take place in relation to the Ebbsfleet development, and we comment further on this in the next section of this response.

BT fully accepts the need for full transparency in any decision to remove regulated wholesale products, including a suitable signalling of intent and a well-defined migration period for operators and consumers. The factors that Ofcom set out for consideration in assessing when existing regulation may need to be updated or removed are all relevant, but it is important that the need to support existing competitive models does not provide a barrier to timely and efficient NGA investment.

7. Next generation access and new build premises

We note that Ofcom will be consulting specifically on new build regulation in the New Year and we look forward to responding fully to that consultation in due course. However at this stage we welcome Ofcom's helpful approach in treating early NGA deployments in a proportionate way to allow for exploration of technical and commercial options, and also for their recognition that the full functionality of existing systems may be difficult to replicate in initial deployments of new technology. We also support Ofcom's approach to continue assessing whether emulation of all features of existing platforms is possible or indeed desirable in an NGA environment.

As Ofcom indicates, BT has taken the view that it will be seeking to meet all its regulatory obligations despite the innovative nature of the network deployment and the challenges which this presents. In particular we intend to fully comply with our universal service obligations, although we welcome Ofcom's recognition that some universal service requirements may need to evolve in due course for NGA deployments.

In respect of the detailed regulatory obligations, the fact that the GEA product has been designed with Equivalence of Input (EoI) considerations from the outset makes the product particularly suitable to meet the underlying requirement in the Universal Services Directive (USD) for users to be able to pre-select their carrier. It also has no legacy customer base issues to address; and migration between CPs will be significantly more straightforward than in the existing network. It is therefore not our intention, at this stage, to provide a CPS or WLR equivalent at the wholesale level for our initial 'day one' launch at Ebbsfleet.

We note that Ofcom will be considering these issues more fully in due course and we will respond to the consultation at the appropriate time. However, our initial view is that there is no strong demand for enforcing compliance with the existing 'copper' based CPS and WLR functional specifications and indeed such obligations might not be practical, economic or appropriate where "local exchange functionality" is no longer considered a bottleneck. Nevertheless as Ofcom notes there may be demand for a simple resale product and BT and other wholesalers should consider whether there are ways in which such a market could be successfully addressed.

As Ofcom indicates, we are continuing to assess how Indirect Access (IA) may be provided at Ebbsfleet (and for other new build fibre sites). This reflects our understanding of the current European regulation but does not signal a view that we agree it is necessary for the continued protection or promotion of competition in an NGA environment. We would also emphasise that at this stage are still reviewing the possible solution but see it as non trivial. Therefore we request that Ofcom consider the latest EU thinking in this area which appears to question whether carrier selection regulation should continue to be mandated.

We still have a significant amount of work to do to deliver on both the Openreach aspects of Ebbsfleet and on BT's own downstream products. However, whilst we continue to work through product design and technical options, we can confirm we are still working towards the position as outlined by Ofcom in the consultation document.

We note that Ofcom intends to consult on the regulatory policy that will apply generically to new build fibre developments and we look forward to participating in that debate. We think that considerable effort has gone into the debate on all sides leading up to this consultation document and we view the initial conclusions which Ofcom has reached as broadly correct and unlikely to be improved upon in the short term without further experience of new build product deployment. As such we support Ofcom's initial conclusions. However for BT and Openreach the new build situation is rapidly moving on and there is a need for Ofcom to give regulatory certainty as soon as possible on the likely regulatory regime for new build sites beyond the initial Ebbsfleet pilot.

As Ofcom indicates, Ebbsfleet is likely to signal the first large scale deployment of a fibre NGA network to consumers (as well as to businesses) in the UK. This decision was taken as a result of a number of factors but perhaps the most significant was the expressed interest of Land Securities in seeing fibre deployed at their development to 'future proof' the communications infrastructure as well as for its perceived value to end-users. BT and subsequently Openreach responded to this challenge and were keen to explore this opportunity to innovate and to build an infrastructure which could support the higher bandwidth demand expected to materialise throughout the long lifetime of the development. The location of the new development and its size meant that it provided an excellent opportunity to pilot an efficient fibre architecture based on GPON technology, given potentially significant new build costs in any event.

In support of this new build project Openreach began communicating with wholesale customers and stakeholders in spring 2007. This process has identified some key issues. A major concern regularly raised by our CP customer base is that there is no significant commercial driver to become involved in the initial Ebbsfleet project because of the low addressable market in the early years of the development and the lack of certainty over the scale of future FTTP deployments. Currently, each month approximately 20,000 new homes in the UK are supplied with new copper infrastructure. This continues to add to the existing copper network base, and although not all new build sites would be ideal candidates[1] for fibre deployment, Openreach estimate that the majority (perhaps 80%) of activity could be redirected towards fibre deployment. This could potentially result in many thousands of homes being supplied with fibre each month.

We are also now seeing significant interest from many other stakeholders such as property developers and public bodies who specifically want fibre

[1] Openreach is continuing to assess what criteria might 'qualify' sites as being suitable for fibre deployment.

infrastructures installed in their new build developments over the next few years, and because of the long lead times required for design, plan and build need commitment from a telecoms infrastructure provider now, to enable them to make continued progress.

For CPs and for Openreach these represent significant commercial opportunities to start building and learning from further fibre deployments but build decisions are being delayed because of uncertainty as to the regulatory regime that would prevail.

In support of this burgeoning demand, Openreach need to be able to begin planning for a transition from a one site “network pilot” to a second phase “network pilot” with additional sites to allow for appropriate testing of network scaling and aggregation effects. Our continued progress on the new build FTTP project has led to an increasing realisation that there are many challenges to overcome and innovative steps will need to be taken to ensure it succeeds. However we are starting to see how it may also offer some potentially radical new opportunities for improving the efficiency and performance of the UK access network for the benefit of end-users.

We therefore agree with Ofcom’s initial view that regulation should not fundamentally focus on replication of existing regulatory remedies but should look instead at underlying principles which lead to an efficient use of resources and generate sustainable competition in an NGA environment. In our view a focus on improving the end-user experience and their ability to access innovative, high quality and good value services must be the primary concern underpinning regulatory decision making. We look to Ofcom to take forward this thinking and give certainty as to the medium term regulatory regime for new build sites as soon as possible.

Annex: BT's response to Ofcom's consultation questions

Question 1 When do you consider it would be timely and efficient for next generation access investment to take place in the UK?

BT generally supports Ofcom's view that there is currently significant uncertainty as to when and how bandwidth demands will increase to a point where next generation access investment (defined as large-scale investment in fibre access) is required to satisfy customer demand**.** The vast majority of users and applications work very well within today's bandwidths and plans are already in place to ensure that more complex and bandwidth-intensive applications can be used over the existing copper network. However, it is important to continue to understand developing consumer demand patterns; the early fibre deployments that are emerging in the UK will give the opportunity to assess the demand for higher bandwidth services. Removing the regulatory barriers to NGA investment would encourage the growth of these early deployments.

(see also Section 1 above)

Question 2 Do you agree with the principles outlined for regulating next generation access?

BT agrees that the principles outlined are appropriate for regulating NGAs. The challenge for Ofcom is to interpret these principles in a way that promotes rather than inhibits efficient and timely investment. Given the substantial amount of money required for NGA investment, there is, however, a question as to whether Ofcom's approach is sufficient to promote investment in NGAs, or whether a more proactive regulatory approach is required.

We believe we need a new, collaborative industry model if major NGA investment is to be realised - collaboration on the basis of supporting a wholesale market based on equal access, within a framework where all NGAs are available to all providers, and operate to common platforms and standards using open architecture in order to support service and application development and delivery.

(see also Section 2 above)

Question 3 How should Ofcom reflect risk in regulated access terms?

BT agrees with Ofcom as to the importance of reflecting risk if NGA investment is to take place. Traditional 'cost plus' regulation suffers from the difficulty of setting *ex ante* rates of return. BT believes there are merits in both the anchor product pricing approach and in allowing upstream prices to be set by the asset owner on a non-discriminatory and equivalent basis, but further work is needed to address practical implementation issues. However, pricing models are unlikely to provide the full answer, not least because the ability of the upstream provider to fully recover risk over a reasonable time-frame is likely to be constrained, particularly in the early years of NGA roll-out by

consumers' willingness to pay (and hence that of downstream CPs). BT believes that there is likely to be a need for new models, involving industry collaboration, if large scale NGA investment is to take place. Regulatory certainty, including the length of time any regulatory framework should last, is also of key importance.

(see also Section 3 above)

Question 4 Do you agree with the need for both passive and active access remedies to promote competition?

BT understands Ofcom's rationale for exploring the potential both passive and active access remedies. We agree with Ofcom that there are practical limitations which apply to passive FTTP options and we do not believe that the economics of sub-loop unbundling, the FTTC passive solution, will allow that to be an effective competitive solution. We believe that an active, Ethernet-based, remedy such as the proposed Openreach GEA product, offers the appropriate economic and technical capabilities.

(see also Section 4 above)

Question 5 Do you consider there to be a role of direct regulatory or public policy intervention to create artificial incentives for earlier investment in next generation access?

BT agrees with Ofcom that the public value arising from NGAs is not yet clear. However, given the lead times and scale of NGA investment, it is important that consideration is given now to what is required to ensure that market-led investment can take place at the appropriate time. There is a need to ensure that there is no artificial 'disincentive' to investment in new technology or services built into the existing regulatory regime, particularly that false signals are not sent to the market in terms of the relative costs of current and next generation access services.

BT believes that the scale of NGA investment required is likely to require new, collaborative business models across industry, which will also include regulators, government, planning authorities and RDAs. Ofcom and government both have a role to play in facilitating discussions going forward.

BT agrees with Ofcom that there is currently no case for direct public intervention in NGA investment. However, there may be a case for funding by RDAs, the Devolved Administrations or local authorities in certain regions, subject to those meeting Ofcom/BERR and state aid guidelines.

(see also Section 5 above)