Geo Networks Limited ("Geo")

Response to the Ofcom: Review of the Wholesale Local Access Market ("Consultation")

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1. Executive Summary

(a) About Geo

Geo has unrivalled expertise in delivering fibre network infrastructure both for the private sector and for major public sector projects. Geo's national and London networks are the newest non-legacy networks in the UK and our business is focused on providing our customers with data network solutions based on dedicated optical fibre. Our strong focus on such next generation infrastructure means that we have a unique insight into the issues at stake in the Wholesale Local Access (WLA) Market Consultation.

Geo is in a strong position to comment as it is currently developing proposals for next generation access (NGA) projects, both for public sector investors and privately. Further, Geo's experience in building and operating the FibreSpeed network with the Welsh Assembly Government in North Wales provides an excellent model for NGA investment in the UK.

(b) Next Generation Access

What is NGA?

There is industry consensus that widespread NGA deployment will pave the way for a faster, efficient and a more innovative digital society with many people now considering NGA as the "fourth utility". With the recent launch of the European Commission's Digital Competitiveness Report,[1] EC Commissioner, Neelie Kroes, said "*Europe's Digital Economy is crucial to economic growth and prosperity. ICTs and high speed internet are as revolutionary in our lives today as the development of electricity and transport networks were over a century ago*".

Long life fixed infrastructure

We believe that policy and regulatory intervention in true NGA should focus on long life fixed infrastructure rather than short life active technology investments. This is analogous to prioritising the building of infrastructure such as roads in preference to subsidising the latest generation of cars or lorries. Optical fibre and its related infrastructure is an equivalent investment: it is a completely service agnostic medium; it is capable of transmitting the widest possible range of digital and analogue signals and even radio frequencies and there is no comparable technology known to the global scientific community.

Future proofed

Investing in a future proofed fibre network will create a long life asset with the greatest flexibility and choice regarding service, symmetry, latency and reliability, allowing active products to change and upgrade in line with market and technology developments, evolving user expectations and patterns of use. With the anticipated 20 to 30 year lifespan for fibre, and flexibility for the type of bandwidth growth, it allows investors to plan for almost unlimited increases in bandwidth.

[1] Commission Staff Working Document Europe's Digital Competitiveness Report Vol 1. Brussels 17.05.2010 (SEC 2010) 627

Open access

In order to achieve maximum efficiency and competition in the market, NGA networks should be truly "open access", providing services to other users at both the passive and active layer. This creates a long-term competitive environment and allows for product differentiation with the greatest choice and lowest prices for consumers. It avoids the creation of new private monopolies as the resulting fibre-leasing businesses which will adopt this model have a simple commercial imperative to maximise the use of their asset and make sure it is deployed by their service provider customers. This business model for infrastructure ownership, separate from the downstream services, is being used in a number of countries around the world for FTTP roll-outs (for the above reasons). This is consistent with the European Commission's position as set out in its EU Framework (due for implementation by the UK this year) and the State Aid Guidelines for investment in NGA networks using public funds.[2]

NGA – The UK's approach

The Coalition Government has indicated it will take a market first approach for NGA focussing on regulation and policy, in particular opening up BT's infrastructure and other third party assets. With the absence of immediate and committed Government funds alongside aggressive spending cuts, it is imperative that Ofcom mandates full access to BT's infrastructure, without arbitrary and unhelpful restrictions, to allow operators to build their own NGA networks using BT's infrastructure assets. This means access to BT's duct infrastructure in both the access and backhaul network, full fibre unbundling and a market definition that supports NGA networks deployed for any industry sector (be it residential, public sector or business). Remedies need to complement the EU Framework and Recommendation and Ofcom should also have due consideration to regulatory regimes successfully applied by other EU Member States.

NGA - Europe's approach

NGA is high on the European Commission's agenda with its recently released Europe 2020 strategy for smart, sustainable and inclusive growth and its Work Programme for 2010 setting out aggressive targets for broadband deployment in Europe. The European Commission's draft Recommendation on NGA encourages an open access technology neutral NGA model with a complete set of passive remedies including fibre unbundling and duct access. Without these remedies, the incumbent will have an unfair monopoly and significant advantages in the market. Any competing networks that are deployed will not be cost effective or efficient if there is a barrier to operators using existing and available infrastructure. The EU Framework (due to be implemented by the UK this year), sets out a direction to Member States to mandate infrastructure sharing. It states, "*National regulatory authorities should be empowered to require that the holders of the rights to install facilities on, over or under public or private property share such facilities or property (including physical co-location) in order to encourage efficient investment in infrastructure and the promotion of innovation".* The Queen in her recent speech to both Houses of Parliament on

[2] Community Guidelines for the Application of State Aid Rules in Relation to Rapid Deployment of Broadband Networks (2009/C 235/04)

25 May 2010 confirmed that Government would facilitate infrastructure sharing to the greatest extent, to enable NGA deployment using existing powers and where necessary primary and secondary legislation.

Ofcom needs to utilise its powers to open up BT's infrastructure to the greatest extent, without unnecessary and unhelpful restrictions; this is consistent with the intentions of Government and the European Commission's Framework and Digital Agenda. This will lower costs for NGA network deployment, encourage investment, stimulate as much competition in the market as possible and lower the barriers to entry for new operators and market investors.

(c) The Wholesale Local Access Market

Fibre unbundling vs. VULA

In respect of the proposed remedies, we do not believe that Ofcom was correct to carve out fibre unbundling in the Consultation. Ofcom's approach is inconsistent with the European Commission's position that encourages fibre unbundling in NGA deployment, "*NRAs should mandate unbundled access to* ***the fibre loop*** *irrespective of the network architecture and technology implemented by the SMP operator.*" [3] While the proposed "VULA" remedy would likely enable replication of incumbent services, it will not give downstream communication providers (CPs) the ability to innovate freely. In particular it would not enable them to provide enhanced service speeds, which has been a characteristic of altnet-led innovation and competitiveness in the past, nor would the full advantages of optical fibre be delivered to consumers and small businesses. Future products which would be denied (or delivered too slowly) to these users could include fully symmetrical network services for home workers, large volume offsite secure data storage for the consumer market, low latency offers for the gaming community or high capacity content creation for small media businesses. To understand how optical fibre can be used when it is uncontended, symmetrical and secure, one need only look at the development of those parts of the business market in the years since access has been given to this infrastructure, together with the explosion in related markets such as data centres, applications, software and connectivity. Similar benefits can be brought to the residential and small business markets but will not happen if the market can only buy resold versions of BT's chosen technology, particularly when BT itself has the ability to accelerate its own roll-out of fibre to the home at times of its choosing.

The need for backhaul access

In addition, we do not agree with Ofcom's apparent determination to exclude access to the backhaul network. This is also inconsistent with the European Commission's approach where in its draft Recommendation it says "*For FTTH, [remedies] may consist of access to civil engineering infrastructure, to the terminating segment, to the unbundled fibre loop of wholesale broadband access as the case may be. On Market 4, it is thus important that in principle*

[3] Draft Commission Recommendation on regulated access to Next Generation Access Networks (NGA) Brussels, [Draft 12 June 2009 for 2nd public consultation] C (2009) page 13, paragraph 20.

*the whole range of different physical access products, including **backhaul**, is available as remedies.*"[4] Ofcom's analysis and consequent artificial demarcation of access and backhaul networks in the Consultation are better suited to the consideration of "active bitstream" services, not the underlying infrastructure, and it does not adequately address the reality of BT's SMP in the relevant market. Ofcom's definition of the WLA market does not reflect the inherent advantage BT has in its close proximity to end users at both ends of a service. For other CPs, the definition of "local" must include an element of wholesale "backhaul" services from BT to return the service to the closest point of presence (PoP), as has been the case for LLU enabled CP network deployment for many years. The removal of the distinction of access and backhaul and the provision of regulated duct and fibre access throughout BT's entire network will allow CPs to operate on a more level playing field to BT.

The proposed remedies are too restrictive

Finally, we do not believe that Ofcom is right in seeking to limit the application of remedies by excluding business and public sector networks. As BT is not regulated in the business and public sector markets, it will have a clean sweep of the NGA market in these sectors, which will be anti-competitive and damaging to the interests of this market, and the CPs seeking to serve them. There are no such restrictions on the LLU remedy in the Current Generation Access (CGA) market and we see no logical reason why the restrictions should apply in an NGA context. Any such restrictions would be difficult, unworkable and detrimental to any operator's business case for the design and deployment of an NGA network. The EU Framework, Recommendation and State Aid Guidelines make no distinction between business, residential and/or public sector NGA networks and Ofcom should not seek to impose such restrictions unilaterally. Indeed, Ofcom's approach is inconsistent with the European Commission's position under its Communication on the Digital Agenda[5] where it states as an action that "*Member States should develop and make operational national broadband plans by 2012 that meet the coverage and speed and take up targets defined in Europe 2020, using public financing in line with EU competition and state aid rules.*"[6]

(d) Remedies

The need for passive remedies

Geo fully supports Ofcom's proposal to regulate access to BT's infrastructure to accommodate NGA roll out in the UK. In principle, we accept that a modified "ladder of investment" approach encompassing both active and passive access remedies should be adopted. However, Geo strongly believes that the remedies proposed by Ofcom do not go far enough to meet the market's requirements; in particular, the absence of key passive remedies such as fibre unbundling and a complete PIA portfolio will limit the effectiveness of non-incumbent NGA deployment in the UK. This is not in the wider interests of the UK market and it

[4] Ibid 3 page 4 paragraph 21.
[5] Communication from the Commission, Europe 2020. A strategy for smart, sustainable and inclusive growth Brussels, 3.3.2010 COM (2010) 2020
[6] Ibid, page 21.

does not accord with the European Commission's recommended suite of passive infrastructure remedies. In its draft Recommendation it says "*In a Fibre to the Home (FTTH) context, duplication of the terminating segment of the fibre loop will normally be costly and inefficient. To allow for sustainable infrastructure competition, it is therefore necessary that access be provided to the terminating segment of the fibre infrastructure deployed by the SMP operator. To ensure efficient entry, it is important that access is granted at a level in the network of the SMP operator which enables entrants to achieve minimum efficient scale to support effective and sustainable competition.*"[7]

Fibre unbundling

Fibre unbundling is a critical remedy missing from the Consultation proposals. Geo and other operators would utilise fibre unbundling in numerous scenarios (such as LLU, SLU and FTTC) and, as stated above, the European Commission encourages Member States to mandate fibre unbundling at the passive layer of the network, "*NRAs should mandate* ***unbundled access to the fibre loop*** *irrespective of the network architecture and technology implemented by the SMP operator.*" [8]

PIA

The PIA remedy does not go far enough to allow operators access to, and effective and efficient use of BT's infrastructure, rather it only allows a limited connection between an end user's property and the closest MDF to that property. The incentive to deploy competing NGA networks is reduced when an operator is faced with long stretches of network build to connect to a point where it can pick up the PIA remedy. Ofcom should encourage competition and new network build by providing operators access to BT's infrastructure at the closest point to their network. We do not believe that BT should have the advantage of using its own legacy network infrastructure to deploy NGA in a market where it holds SMP while other operators are only offered a limited and insufficient option to use that infrastructure. Ofcom needs to extend the PIA remedy to other MDF sites on BT's infrastructure. This will stimulate competition and investment in the market and allow operators to compete with BT on a level playing field.

Duct capacity and BT's reference offer

To overcome difficulties with congested ducts or limited capacity, we suggest Ofcom mandates that BT offer dark fibre to operators in those scenarios where PIA cannot be provided. Alternatively, as there is only a finite amount of space in BT's ducts, the operator that gets to use it first should not be allowed to deny access to the rest of the market. On the other hand, as Geo can testify, leasing this capacity to others is an attractive business and one which, with the appropriate attention to the creation of fibre leasing reference offers from BT and others, can remove many of the concerns about duct and pole access. Let the company who chooses to invest first enjoy the returns from its investment – but do not allow it to prevent the rest of the market from accessing this new network.

[7] Ibid 3 page 4, paragraph 16.
[8] Ibid 3 page 13, paragraph 19.

We also believe BT's reference offer should have been given before it began selling NGA services at a retail level. BT currently has, and will continue to have an unfair advantage in the market for NGA services until a satisfactory reference offer is made available. We note the European Commission's view on this is that incumbents should provide reference offers before they begin selling their own services to create a competitive environment: "*NRAs should apply non-discriminatory principles in order to avoid any* ***timing advantage*** *for the retail arm of the SMP operator. The latter should be obliged to update its wholesale offer before it launches new retail services based on fibre to allow competing operators enjoying access a reasonable period of time to react to the launch of such products. Six months is considered a reasonable period to make the necessary adjustment.*"[9]

VULA

Ofcom is portraying the proposed VULA remedy as an attempt to satisfy mass market CP aspirations to maintain their competitive position in NGA markets, in a way comparable with the use of LLU in a CGA world. Geo is not convinced that this approach will work, not least because VULA is clearly neither a complete supply-side or demand-side substitute for copper or fibre unbundling, as it does not enable the downstream CP to deploy the technology of its choice at both ends of the physical media, and thereby take full control of system parameters. Ensuring that alternative operators continue to have this ability to differentiate and innovate is essential to preserve and enhance the effective market that has been created through the previous regulatory intervention in this area, namely the creation of the passive LLU remedy. Given that VULA as it is currently understood does not allow independent determination of connection speed and QoS, it cannot be considered an effective substitute for CGA copper loop or subloop unbundling, or NGA fibre loop or subloop unbundling, except where unbundling is not economically viable for the alternative operator concerned. It is also worth noting that it is doubtful that VULA is a valid remedy in Market 4, particularly if it is promoted as an alternative to effective fibre unbundling, as it seems to be by Ofcom.

[9] Ibid 3, page 7, paragraph 39.

2. Introducing Geo and FibreSpeed

(a) Background to Geo

Geo has unrivalled expertise in delivering fibre network infrastructure both for the private sector and on major public sector projects with state involvement.

Geo's network is the newest non-legacy network in the UK and our business is focused on providing dedicated optical fibre for our customers. Geo's disruptive business model is based on a distinctive conceptual approach towards the industry, which we have given much intellectual thought to before and since Geo was formed in 2004. In Geo's view there is a fundamental difference between the infrastructure required for modern data networks and the network equipment used to supply services over them. Consequently, the industry is best viewed as three distinct and inter-related areas: infrastructure, network and services. Geo is positioned primarily in the area of infrastructure and the fibre, space, environmental management systems and power that we provide have more in common with real estate than with traditional telco services. We provide these services to our customers on long-term leases so that they are able to exploit and change the use of these assets over time as they wish. If requested by the customer, we also offer to design and build optical transmission solutions, and, again on an optional basis, to operate the resulting in-life private network service for the customer.

This business model is consistent with – for example – the UK approach in the Telecommunications Strategic Review whereby BT's access infrastructure was separated from the downstream network and services businesses. It is also consistent with the European Commission's approach, which focuses SMP regulation on upstream product markets where possible.

Geo has valuable experience in the practicalities of national and urban fibre deployment. Our 3000km optical fibre network is the newest, highest quality and most reliable optical fibre network in the UK. It tracks the national mains gas pipeline and connects all major commercial centres. Our London network is the most reliable in the capital, currently spanning 85km, extending fast and buried deep in Thames Water's sewer system, making it highly diverse, resilient and secure.

The new and different approach that Geo has taken has not only been profitable for Geo but has genuinely altered the shape of the market. Before Geo began providing fibre-based backbone network and backhaul services to large broadband providers it was virtually impossible for customers to secure access to wide area optical fibre infrastructure to allow them to design their own networks, choose their own technology solutions and benefit from the fixed and low cost scalability, which high quality assets provide. This ability for new entrants to these markets to compete on a level playing field in at least the core network (as if they were their own telco) with vertically-integrated players such

as BT and Virgin Media has been a critical factor in the successful roll-out of LLU services over the last few years, increasing competition in the broadband market and lowering prices to consumers. Today, Geo continues to grow its significant position in this market as well as assisting its customers in finding ways of using infrastructure-based solutions to improve the quality, capacity and cost of the critical "middle mile" backhaul networks. It is in this middle mile that the ever-increasing network demands from bandwidth-hungry internet services such as YouTube and iPlayer are felt most keenly by ISPs.

However, Geo's dedicated fibre proposition has gained significant traction in far more sectors than just the broadband market. It serves customers in a number of markets:

- wherever a large data network is needed to connect two or more customer sites;
- for carriers, mobile operators, systems integrators;
- in the public sector including the FibreSpeed contract with the Welsh Assembly Government and extensive deployment within the NHS Connecting for Health project; and
- in traditional early adopter end-user markets such as financial services, broadcasting, media and professional services.

In certain sectors, such as that for critical data centre connectivity for the very largest end users, this rapid market transformation has taken hold to such an extent that dedicated (or "dark") fibre is now almost always requested in a major request for a competitive tender, at least as an alternative to a managed service and often exclusively.

This is a significant transformation from the time before Geo's entry to the market when no telco in the UK willingly and openly offered this service. Before 2004, a large customer would occasionally request dedicated fibre, knowing the advantages it would bring, and a telco might grudgingly provide it in private rather than lose the business. Now this choice is a reality for many businesses and public sector organisations who understand it provides a fundamentally lower cost and superior way of running an essential long-term input to their organisations' successful operations.

In 2008, the success of its business model led to Geo's acquisition out of the Hutchison Whampoa Group by Alchemy Partners, the UK's leading private equity firm.

In essence, Geo is relying for success on the quality and size of its own fibre assets, together with its skills in network integration, new build, network design and network operation. Its disaggregated business model appeals to customers who have the technical competence to select and control their own data networks (even if they then outsource the network build and operation). Above all, it relies upon the current supremacy of optical fibre as the transmission medium of choice for large data networks and isolates the volatile component – how the fibre is lit – so that the ever-changing technologies in this space are

presented to the customer as options it can control at the lowest possible unit cost over the much longer lifetime of the fibre asset.

The result for Geo has been an average contract term to date of over 10.5 years: increasing revenue and profit visibility for investors and building a rapidly growing business. The company is already profitable, has no debt and sufficient cash to continue its expansion.

(b) Geo's Participation in FibreSpeed in Wales

Following an EU open procurement process, the Welsh Assembly Government awarded a 15-year contract on 8 November 2007 to Geo to design, build, operate, maintain and commercialise the FibreSpeed network. The business model that was ultimately created in negotiation with Geo was for an operating business (FibreSpeed) which sells exclusively to service providers including, critically, access to passive network components. These service providers in turn use FibreSpeed's services and their own to engage the end-user community and sell network-based services and solutions. The aim of FibreSpeed was to stimulate economic growth by:

- improving the communications infrastructure offered in North Wales;
- creating employment opportunities through the construction of the network;
- creating investment and employment opportunities by attracting new organisations to the region and supporting growth of existing organisations;
- stimulating competition across the region in the supply of advanced next generation broadband services through facilitating downstream investment by retail service providers;
- ensuring retail prices for advanced broadband services could be offered on par with the other major cities and urban areas of the UK.

The network was launched in 2008 by the Deputy First Minister of Wales and went live in April 2009. The network has received promising take up and high demand for services in an area which to date has been poorly served. FibreSpeed already shows clear signs of success, having had a clear, positive impact on North Wales to date:

- The advantages of FibreSpeed has led to 12 service providers (FibreSpeed service providers) across North Wales requesting access. Some of these FibreSpeed service providers are new to the market or have substantially expanded their service offerings, which range from high-speed Internet connectivity to hosting services, security solutions and CCTV applications.
- Case studies of individual businesses changing their connection to FibreSpeed service providers (such as Carrier Wales, Fibre Wales and Advanced Information Systems Ltd (AIS)) have demonstrated typical cost savings of 20–30%.
- FibreSpeed has, we believe, stimulated a competitive reaction from BT in the form of an upgrade of its service portfolio. Improved retail pricing to businesses renewing contracts where FibreSpeed services are available, has also become apparent.

- FibreSpeed has created the opportunity for businesses to provide a range of new services, for example by offering symmetrical bandwidth services. Such new services include IT outsourcing, which can now be offered to local companies in North Wales.
- FibreSpeed has, and should continue to have, other direct positive impacts, including employment opportunities related to network roll-out, operations and service providers' business growth. This should stimulate overall economic growth; provide greater incentives for businesses to operate from the region and lead to lower cost bases for businesses connected to the FibreSpeed network.

The success of FibreSpeed is reliant on the managing entity living and breathing these objectives. It is the synergy of these aims with Geo's usual business that will mean Geo is best placed to do this and drive the success of the project not just through delivery but through the operating years.

3. Our Response

(a) Next Generation Access

A digital society

NGA is a hot topic for consumers, businesses, the public sector and governments globally. Although there are differing opinions about what NGA means, there is a consensus that widespread NGA deployment will pave the way for a faster, efficient and a more innovative digital society. It is beyond doubt that demand for broadband is increasing at a rapid rate. New applications, networks, online tools and cloud computing are putting greater strains on existing bandwidth capacity and pushing broadband capabilities to their limits. In addition to the internet, people understand that an NGA infrastructure will greatly improve many other sectors of industry including transportation, utilities, environment, education and healthcare to name a few, and as a result, people now view NGA networks, and the services that run over them, as a "fourth utility". With the recent launch of the European Commission's Digital Competitiveness Report,[10] EC Commissioner, Neelie Kroes, said "*Europe's Digital Economy is crucial to economic growth and prosperity. ICTs and high speed internet are as revolutionary in our lives today as the development of electricity and transport networks were over a century ago*".

At a recent conference in Moscow, a Google executive claimed that World Wide Web consumers will triple in the next ten years. Mobile subscriptions will jump to 10 billion and internet content will increase to 53 Zettabytes.[11] During the opening press conference of the WSIS Forum 2010 in Geneva, ITU Secretary-General Dr Hamadoun Toure said: "*In the 21st century, affordable, ubiquitous broadband networks will be as critical to social and economic prosperity as networks like transport, water and power. Not only does broadband deliver benefits across every sector of society, but it also helps promote social and economic development, and will be key in helping us get the Millennium Development Goals back on track*."[12]

Benefits of NGA

NGA will increase time efficiencies by providing faster online services. It will also facilitate a move to more transactions and activities online. Such activities will include improved business facilities, public services, health services, education, and government services. It will pave the way for smarter energy grids, smarter transportation and environmental systems and generally improve efficiency for businesses and consumers. NGA will facilitate new tele-presence conferencing, e-healthcare in the home and more efficient IT systems such as cloud computing. It will reduce costs incurred during every day life, make home and business tasks smarter and faster, improving general wellbeing and family life. It will reduce road congestion and transportation costs and lay a foundation to develop new and groundbreaking services and facilities.

[10] Commission Staff Working Document Europe's Digital Competitiveness Report Vol 1. Brussels 17.05.2010 (SEC 2010) 627
[11] Referenced in Total Telecom on 13/05/10 http://www.totaltele.com/view.aspx?ID=455479&mail=256&C=0
12 http://www.itu.int/bbcommission/commissioners.html

What is NGA?

It is widely understood that NGA will revolutionise the economy and people's daily lives. However, it is also recognised that building next generation networks will involve significant upfront capital investments. Therefore it is critical that any investment in NGA is made into long life, future proofed infrastructure with the greatest flexibility and capacity to handle technological development and public demand. We believe that policy and regulatory attention in true NGA should focus on long life fixed infrastructure rather than short life active technology investments. This is analogous to prioritising the building of infrastructure such as roads in preference to subsidising the latest generation of cars or lorries. As set out in Section 2 of our Consultation response, the market should be viewed as three distinct and inter-related areas; infrastructure, network and services. There are fundamental differences between the infrastructure required for modern data networks, the network equipment used to supply services over them, and the subsequent active products. Indeed, it is "infrastructure" that is central to NGA (replacing the old legacy copper networks with next generation fibre networks). Ofcom need to focus on and regulate BT at the infrastructure layer; this is consistent with the European Commission's position on NGA whereby its directions to Member States focus on infrastructure competition. The Commission has issued a draft Recommendation on NGA that will form part of the amended EU Framework for telecommunications regulation[13]. The final Recommendation is due for release this summer 2010 and will give Member States guidance on the future design of regulatory requirements for NGA. The draft Recommendation states, "*To ensure efficient entry, it is important that access is granted at a level in the network of the SMP operator which enables entrants to achieve minimum efficient scale to support effective and sustainable competition. Where necessary specific interfaces could be required to ensure efficient access is gained.*"[14]

Future proofed fibre networks

Optical fibre and its related infrastructure is a completely service agnostic medium; it is capable of transmitting the widest possible range of digital and analogue signals and even radio frequencies and there is no comparable technology known to the global scientific community. The characteristics have been stable for 30 years making it a trusted technology. Investing at the passive layer will create a long life asset with the greatest flexibility and choice regarding service, latency and reliability, allowing active products to change and upgrade in line with market and technology developments evolving user expectations and patterns of use.

Scaleable and uncontended

Fixed infrastructure investments, such as optical fibre assets, are critical enablers for efficient delivery of higher bandwidth wireless solutions, particularly in rural areas. With the anticipated 20 to 30 year lifespan for fibre, and flexibility for the type of bandwidth growth, it allows investors to plan for almost unlimited increases in bandwidth. Further, in evaluating its options, an investor should also consider the cost effectiveness over the whole lifecycle of the infrastructure.

[13] Ibid 3.
[14] Ibid 3 page 4 paragraph 16.

A solution that minimises repeated investments in technology upgrades will, in the long run, demonstrate superior value for money, compared to the upgrade cycles associated with some solutions. To this end we suggest that point to point (PtP) networks, rather than shared fibre Passive Optical Network (PON or GPON) architecture favoured by many incumbents, are the basis of the most effective network model, as it provides the greatest flexibility and scalability to meet increasing bandwidth demands.

Symmetrical and low latency

Just as important as nominal bandwidth is the largely unsatisfied need for more symmetrical capability. Unlike current copper telco and co-axial cable TV systems, fibre based networks are inherently capable of providing fully symmetrical services, at much higher and dependable quality and without any significant distance limitations. Our view is that the fibre based networks of the future will be full communication networks capable of sending information as fast upstream as downstream (just as large businesses have come to use them over the last 15 years). Consumers are likely to move to large-scale usage of data centre services as the quantity of data overwhelms the storage capacity of residential IT equipment.

Open access networks

It is also important that the design and deployment of any NGA network will allow for multiple service providers to lease the "open access" infrastructure, including access to the underlying fibre and duct elements. This avoids the creation of new private monopolies as the resulting fibre-leasing businesses which will adopt this model have a simple commercial imperative to maximise the use of their asset and make sure it is deployed by their service provider customers. This business model for infrastructure ownership separate from the downstream services is being used in a number of countries around the world for their FTTP roll-outs (for the above reasons) and has the advantage of being consistent with the European Commission's position as set out in its EU Framework (due for implementation by the UK this year) and the State Aid Guidelines for investment in NGA networks using public funds.

(b) A Vision for the UK

The Universal Service Commitment

In the UK, the Government's Universal Service Commitment aims to deliver a minimum of 2Mbps broadband to 100% of the UK by 2012. In addition to this, the Digital Britain Report made one of its five key objectives, "*Upgrading and modernising our digital networks – wired, wireless and broadcast – so that Britain has an infrastructure that enables it to remain globally competitive in the digital world.*" In the Government's Coalition Agreement, it confirmed it will take a market first approach and ensure that BT and other infrastructure providers allow the use of their assets to deliver broadband in remote areas at the same time as in more populated areas. If necessary, it will consider using the part of the TV licence fee from the digital switch over.

Europe's position

NGA is also high on the European Commission's agenda with it recently releasing its Europe 2020 strategy for smart, sustainable and inclusive growth[15] and its Work Programme for 2010 setting out an aggressive timetable to develop and release a set of NGA directives and recommendations for implementation by Member States.[16] The Europe 2020 Strategy has underlined the importance of broadband deployment to promote social inclusion and competitiveness in the EU. It states the objective to bring basic broadband to all Europeans by 2013 and seeks to ensure that, by 2020, (i) all Europeans have access to internet speeds of above 30Mbps and (ii) 50% or more of European Households subscribe to internet connections above 100Mbps. In its Communication on the Digital Agenda for Europe[17], the Commission said: "*The development of high speed networks today is having the same revolutionary impact as the development of electricity and transportation networks had a century ago. With ongoing developments in consumer electronics, the lines between digital devices are fading away. Services are converging and moving from the physical into the digital world, universally accessible on any device, be it a smartphone, tablet, personal computer, digital radio or high definition television. It is projected that, by 2020, digital content and applications will be delivered almost entirely online.*"[18]

The UK's position

Within days of the formation of the Coalition Government, it released aggressive spending cuts to reduce the deficit, in particular major cuts in IT spending. With the absence of immediate and committed Government funds available for intervention and an indication that it will favour using policy and regulation instead, it is imperative that Ofcom create the right remedies and requirements on BT for NGA deployment that are best suited to and most effective for use by operators in the market. Ofcom must mandate full access to BT's infrastructure to allow operators to build their own fibre based NGA networks using BT's passive infrastructure assets. This includes full access to fibre and ducts in both the access and backhaul network. Restricted access to duct in only part of the BT network, and a limited "active" access remedy such as VULA will be detrimental to the market and consumers' long-term interests.

Article 43 within the amended EU Framework[19] (yet to be implemented by the UK) sets out directions to Member States to mandate infrastructure sharing for the efficient deployment of NGA networks.

[15] Ibid 5.
[16] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Commission Work Programme 2010 Time to act Brussels, 31.3.2010 COM (2010) 135 final Vol 1.
[17] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. A Digital Agenda for Europe Brussels 19.05.10 COM (2010) 245
[18] Ibid page 5
[19] Directive 2009/136/EC of the European Parliament and of the Council of 25 November 2009 amending Directive 2002/22/EC on universal service and user rights' relating to electronic communications networks and services, Directive 2002/58/EC concerning the processing of personal data and the protection of privacy in the electronic communications sector and Regulation (EC) No 2006/2004 on cooperation between national authorities responsible for the enforcement of consumer protection laws (*) Article 43.

"It is necessary to strengthen the powers of the Member States as regards holders of rights of way to ensure the entry or roll-out of a new network in a fair, efficient and environmentally responsible way and independently of any obligation on an operator with significant market power to grant access to its electronic communications network. Improving facility sharing can significantly improve competition and lower the overall financial and environmental cost of deploying electronic communications infrastructure for undertakings, particularly of new access networks. National regulatory authorities should be empowered to require that the holders of the rights to install facilities on, over or under public or private property share such facilities or property (including physical co-location) in order to encourage efficient investment in infrastructure and the promotion of innovation, after an appropriate period of public consultation, during which all interested parties should be given the opportunity to state their views. Such sharing or coordination arrangements may include rules for apportioning the costs of the facility or property sharing and should ensure that there is an appropriate reward of risk for the undertakings concerned. National regulatory authorities should in particular be able to impose the sharing of network elements and associated facilities, such as ducts, conduits, masts, manholes, cabinets, antennae, towers and other supporting constructions, buildings or entries into buildings, and a better coordination of civil works. The competent authorities, particularly local authorities, should also establish appropriate coordination procedures, in cooperation with national regulatory authorities, with respect to public works and other appropriate public facilities or property which may include procedures that ensure that interested parties have information concerning appropriate public facilities or property and on-going and planned public works, that they are notified in a timely manner of such works, and that sharing is facilitated to the maximum extent possible."

Indeed the Queen's speech to both houses of Parliament confirmed that NGA is a high priority and shared infrastructure will be the key policy initiative to enable NGA roll out. This will be done by facilitating maximum infrastructure access under existing powers and, if necessary, further use of primary or secondary legislation as soon as possible.

"My Government will enable investment in new high-speed broadband internet connections…Countries around the world are moving ahead with rolling out high-speed 'next generation' broadband based on fibre optics rather than copper. The next generation of broadband is essential to our future prosperity and important for all communities. The UK has made a start on deployment, but we want to go further. Government will be looking at ways of ensuring a strong, competitive, market-led approach to next generation broadband roll-out across the country. Much of the cost of broadband roll-out is the cost of civil engineering – for example, digging up roads. Making it possible for companies wishing to build out new high-speed broadband networks to use the infrastructure that is already in place could significantly reduce costs and drive more commercial investment, including in rural areas where the current market case for investment is less attractive. Steps now to reduce the cost could make

a significant contribution to broadband availability and open the market to new players. Powers exist in current legislation, which can be used to enable some infrastructure sharing. We need to do more work to understand fully what would need to be done to enable greater infrastructure sharing – what can be done using existing powers and what might require legislation, whether primary or secondary. If we do need legislation we stand ready to bring it to the House as soon as possible."[20]

Ofcom need to utilise its powers to open up BT's infrastructure, without unnecessary and unhelpful restrictions; this is consistent with the intentions both of UK Government and the European Commission's Framework and Digital Agenda.

(c) The Regulated Market

The need for regulatory certainty

Regulatory certainty is a pre-requisite for any investment in NGA and it is essential that Ofcom define a clear set of BT assets, which represent enduring economic bottlenecks, and then provide regulated access to those assets to foster competition. The European Commission's Recommendation currently encourages an open access technology neutral NGA model with spare capacity to allow several operators to deploy their fibre lines, including sufficient space in ducts. Without this access, the incumbent has an unfair monopoly and advantage over other players. Any networks deployed will not be cost effective or efficient if there is a barrier to operators using existing and available infrastructure to deploy that network. Ofcom must ensure it does everything necessary to create the right conditions to encourage private investment in NGA, stimulate as much competition in the market as possible and lower the barriers to entry for new operators and market investors.

Networks should be open access

The regulatory environment is not only important for the reasons of competition and market entry, there is also a requirement on National Regulatory Authorities (NRAs) to implement the right conditions required by the European Commission under the EU Framework and, for networks built with public funds, the State Aid Guidelines. An open access network, at both the passive and active layer is a key requirement for approval under the Guidelines[21] if investment is made using public funds. We believe that greater promotion of the open access business model for NGA fibre roll-out (including its effective application to BT Openreach) is needed and, as stated by the European Commission in the Guidelines that it should be mandatory where there is any public money used. Specifically the Guidelines anticipate an environment where the incumbent's infrastructure is made available for use in any network deployment. Paragraph 51 of the Guidelines state that, in assessing the proportional character of the notified measures in "white" or "grey" areas, through its decision making process, the Commission has highlighted a number of necessary conditions to minimise any

[20] http://www.number10.gov.uk/queens-speech/2010/05/queens-speech-high-speed-broadband-connections-50591
[21] Ibid 2

State aid involved and the consequent potential distortions of competition. The lack of any [condition] would require an in-depth assessment and it would likely lead to a negative conclusion on the compatibility of the aid with the common market. Condition (e) Use of Existing Infrastructure is as follows:

"*Where possible, Member States should encourage bidders to have recourse to any available existing infrastructure so as to avoid unnecessary and wasteful duplication of resources. In order to try and limit the economic impact on existing network operators, the latter should be given the possibility to contribute their infrastructure to a notified project. At the same time**, this condition should not end up favouring existing incumbents especially in cases where third parties may not have access to this infrastructure or inputs that are necessary to compete with an incumbent***."

In addition to using available incumbent and third party infrastructure for the network build, the Guidelines also specify that the resulting network must be operated on an open access basis. "*In addition, whatever the type of NGA network architecture that will benefit from State aid, it should support effective and full unbundling and satisfy all different types of network access that operators may seek (including but not limited to **ducts, fibre and bitstream**).*"[22]

The open access network model creates maximum competition in the market place, lowers the barrier to entry by allowing operators to come in and compete at the most cost effective level of the network. We do not accept the traditional model of tightly coupled vertical integration between infrastructure operation and service provision is the right way forward – with current and future IP based technologies, the two roles are very different, have widely divergent business characteristics and should offer the opportunity for clearly separate investment decisions. As the Berkman study for the Federal Communications Commission[23] has indicated, there is evidence that the adoption of such a model leads to maximisation of benefits overall – infrastructure is run to optimise scale and volume economies whilst services are more innovative and deliver greater consumer benefits. We believe that greater promotion of the open access business model for NGA fibre roll-out (including its effective application to BT Openreach) is needed.

The State Aid Guidelines

When building NGA networks, it is essential to avoid the recreation of old monopolies. Open access networks (at both the passive and active layers) will ensure that the market does not favour the existing incumbent and allows investors and operators the maximum scope to secure funding for projects in the most innovative ways possible. In the likely absence of immediate additional Government funds, it is likely that public sector bodies will need to pursue other funding resources such as the Rural Development Programme for England (RDPE) Funding and European Regional Development Funding (ERDF) to

[22] Ibid 2, paragraph 79, 3rd bullet point.
[23] Next Generation Connectivity: A review of broadband Internet transitions and policy from around the world, the Berkman Centre for Internet and Society, Harvard University.

deploy NGA networks. When deploying networks using any form of public funding, investing authorities will need to comply with the State Aid Guidelines. Therefore it is important that Ofcom have due consideration to these requirements when prescribing remedies on BT's network in the WLA market.

If as set out above, the Government is going to support a "market first" model for NGA, it is essential that Ofcom create the right conditions to facilitate investment and competition. We strongly believe that Ofcom needs to prescribe a complete and robust set of remedies in the WLA market. This means access to BT's duct infrastructure in both the access and backhaul network, full fibre unbundling and a market definition that supports NGA networks deployed for any industry sector (be it residential, public sector or business). The remedies need to complement the EU Framework and Recommendation and Ofcom should also have due consideration to regulatory regimes successfully applied by other Member States.

(d) The Market Definition

We consider that Ofcom's market analysis is complex and confusing, leading to unsuitable and in some cases unworkable conclusions. Whilst it recognises there is a difference between CGA and NGA, it concludes that they currently form part of the same market, since a "chain of substitution" exists. Geo strongly believes that this is not the case and that the application of the standard SSNIP test to customers already enjoying the benefits of NGA based services would demonstrate their unwillingness to accept a CGA based "substitute". This faulty analysis leads to a number of consequent problems, as listed below.

(i) Fibre Unbundling

The need for fibre unbundling

We do not believe Ofcom was correct to carve out fibre unbundling as a potential remedy. We strongly believe that there should be a clear delineation between CGA and NGA environments, and an appropriate sets of remedies applied in each case. Ofcom's approach is in contradiction with the European Commission's position that encourages fibre unbundling in NGA deployment, "*NRAs should mandate unbundled access to* ***the fibre loop*** *irrespective of the network architecture and technology implemented by the SMP operator.*" [24]

VULA vs fibre unbundling

While the proposed "VULA" remedy would likely enable replication of incumbent services, it will not give downstream CPs the ability to innovate freely. In particular it would not enable them to pioneer higher bandwidth services, which has been a key aspect of innovation and competitiveness in the past, nor would the full advantages of optical fibre be delivered to consumers and small businesses. Future products which would be denied (or delivered too slowly) to these users could include fully symmetrical network services for home workers, large volume offsite secure data storage for the consumer market, low latency offers for the gaming community or high capacity content creation for small

[24] Ibid 3 page 13, paragraph 20.

media businesses. To understand how optical fibre can be used when it is uncontended, symmetrical and secure, one need only look at the development of those parts of the business market in the years since access has been given to this infrastructure, together with the explosion in related markets such as data centres, applications, software and connectivity. Similar benefits can be brought to the residential and small business markets but will not happen if the market can only buy resold versions of BT's chosen technology, particularly when BT itself has the ability to accelerate its own roll-out of fibre to the home at times of its choosing.

(ii) Access and Backhaul

The need for access in the backhaul

We do not agree with Ofcom's apparent determination to exclude access to the backhaul network. This is also inconsistent with the European Commission's approach where in its draft Recommendation it says "*For FTTH, [remedies] may consist of access to civil engineering infrastructure, to the terminating segment, to the unbundled fibre loop of wholesale broadband access as the case may be. On Market 4, it is thus important that in principle the whole range of different physical access products, including* ***backhaul****, is available as remedies.*"[25]

The proximity issue

Further, we do not agree with Ofcom's analysis and definition of what is "access" and what is "backhaul". The artificial demarcation of access and backhaul networks in the Consultation are better suited to the analysis of "active" "bitstream" services, not the underlying infrastructure, and do not reflect the reality of BT's SMP in the relevant market. Ofcom's definition of the WLA market does not show the inherent advantage BT has in its close proximity to end users at both ends of a service. For other CPs, the definition of "local" must include an element of wholesale "backhaul" services from BT to return the service to their closest PoP, as has been the case for LLU enabled CP network deployment for many years. BT has approximately 5500 PoPs with a nationally ubiquitous connecting duct infrastructure that can be used to serve end users anywhere in the UK, whereas the vast majority of BT's competitors have less than 100 PoPs. This means that in most instances, BT can provide a service to most of the UK without resorting to long and costly civil digs or infrastructure investment. There are other competitive advantages which are inherent including more efficient lower latency routes, better resilience and higher levels of service all at lower cost than other CPs would incur. BT's competitors have no choice but to rely on the relatively expensive options of new infrastructure build or medium to long distance BT bit stream services. As a result, there is no true competition in this space in the market and it will not achieve the efficiencies or cost savings that could be possible if full access were granted to BT's infrastructure. The removal of the distinction of access and backhaul and the provision of regulated duct and fibre access throughout BT's entire network will allow CPs to operate on a more level playing field to BT with the ability to extend their infrastructure closer to the end user.

[25] Ibid 3 page 4 paragraph 21.

CPs should be able to connect to BT's network at any point that is practically feasible and use the infrastructure to create a similar local access reality to BT. This is consistent with the European Commission's position on passive infrastructure remedies in its draft Recommendation: "*Where the SMP operator deploys FTTH, NRAs should, in addition to the above remedies, mandate unbundled access to the fibre loop. Such remedy should be accompanied by appropriate measures assuring* ***co-location and backhaul****. Access should be given at the most appropriate point in the network, which is normally the Metropolitan Point of Presence (MPoP).*"[26]

In order to show this issue with proximity and the ineffectiveness of arbitrary distinctions between "access" and "backhaul" we have set out a diagram in Annex 1 to illustrate this (see diagram 1).

(iii) Limited Application of Remedies

The remedies are too restrictive

We do not believe that Ofcom is right in seeking to limit the application of remedies by making them specific to residential networks and users. NGA networks will ultimately connect all of society from the business sector to residential houses to public sector agencies. There will be also be wireless mobile masts sitting on fixed lines distributing mobile broadband with those services also being used for a range of purposes across all sectors of society. As set out in paragraph (a) of this Section 3, we have highlighted that the purposes and functions of NGA will spread much further and wider than simply broadband (we gave examples of smart metering, utilities and transport grids). If Ofcom were to try and impose such unworkable restrictions on operators it will be detrimental to their business case for, and design of, any NGA network. The European Commission does not make any such distinction in its EU Framework and directives: therefore we do not feel that Ofcom should take this approach either.

It is important to note that if BT is not regulated in this market (NGA for the business and public sector), it will have a clean sweep of the business and public sector NGA market which will be anti competitive and damaging to the interests of both the enterprises in market, and the CPs seeking to serve them. This is clearly inconsistent with the guidance from the European Commission, which says as soon as the incumbent releases NGA products (in any market sector), NRAs must ensure it provides a reference offer to allow operators to compete with it.

"*NRAs should apply non-discriminatory principles in order to avoid any* ***timing advantage*** *for the retail arm of the SMP operator. The latter should be obliged to update its wholesale offer before it launches new retail services based on fibre to allow competing operators enjoying access a reasonable period of time*

[26] Ibid 3, page 13 paragraph 19.

to react to the launch of such products. Six months is considered a reasonable period to make the necessary adjustment."[27]

The need to comply with the European Directives

The European Commission's State Aid Guidelines encourage Member States to mandate infrastructure sharing without discrimination in respect of network use. The Guidelines state: "*Member States may decide in accordance with Community regulatory framework for e-communications, for instance, to ease the acquisition process of rights of way, require that network operators co-ordinate their civil works and/or share part of their infrastructure*."[28] Under Ofcom's current proposal, the FibreSpeed network, deployed in Wales for the Welsh Assembly Government[29], referenced frequently throughout the State Aid Guidelines, would not be able to access or make use the PIA remedy (the first phase of the project connected business parks in North Wales). The FibreSpeed project is a primary example of where competition would have been greater in the market, resources saved and the cost of the project reduced if the PIA remedy were available for use. Indeed, the European Commission Communication on the Digital Agenda[30] states as an action that "*Member States should develop and make operational national broadband plans by 2012 that meet the coverage and speed and take up targets defined in Europe 2020, using public financing in line with EU competition and state aid rules.*"[31] The Digital Agenda, Communication and State aid Guidelines make no distinction between business, residential and/or public sector NGA networks. In order to demonstrate how an NGA network cannot logically be defined or limited to sectors or use over its lifetime, we have set out a diagram in Annex 1 to show the different scenarios that NGA networks create (see diagram 2).

(e) Regulatory Remedies

The need for passive remedies

Geo fully supports Ofcom's proposal to regulate access to BT's infrastructure to accommodate NGA roll out in the UK. In principle, we accept that a modified "ladder of investment" approach encompassing both active and passive access remedies should be adopted. However, Geo strongly believes that the remedies proposed by Ofcom are not comprehensive enough to meet the market's requirements and do not accord with the European Commission's recommended suite of passive infrastructure remedies. In particular, the absence of a fibre unbundling remedy will limit the effectiveness of non-incumbent NGA deployment in the UK and will limit market competition and new investment. Further, the proposed PIA remedies do not go far enough to enable operator's to successfully utilise BT's infrastructure for NGA deployment. By way of example, we have set out in Annex 1, 6 diagrams showing the different ways network operators could and would use BT's infrastructure to deploy their own NGA networks. Without suitable fibre unbundling (in an LLU and SLU context) plus

[27] Ibid 3, page 7, paragraph 39.
[28] Ibid 2, paragraph 60.
[29] See Section 2 of our Consultation response.
[30] Ibid 5.
[31] Ibid 5, page 21.

adequate access to BT's duct infrastructure, almost none of these scenarios would be feasible (see diagrams 3 – 8).

We have already described above that the market analysis and conclusions should not be confined to what Ofcom has defined as the "access market" and that it should extend prescribed remedies to the backhaul network to ensure that the remedies are economically viable. Furthermore, we have said that we do not believe that the remedies should be limited to certain market sectors. The European Commission recommends full access to the incumbent's infrastructure, including in backhaul. It does not stipulate any industry sector limitation on the use of the remedies as mentioned above. By way of example, the annual 2010 Regulatory Scorecard published by ECTA and released to the European Parliament today shows the Netherlands is the most well connected country in Europe thanks to a pro-active regulator and an open and competitive telecoms market, which ensures that Dutch consumers and businesses benefit from low prices, broad choice and high broadband speeds.[32]

In this section we set out our comments on the remedies proposed by Ofcom in the Consultation and where we think those remedies need to change or be improved.

(i) Fibre Unbundling

The need for fibre unbundling

Fibre unbundling is a critical remedy missing from the Consultation proposals. As noted in our earlier comments on Ofcom's market analysis, it does not follow that fibre unbundling should be excluded as a remedy. Geo and other operators would utilise fibre unbundling in numerous scenarios (such as LLU, SLU and FTTC). We attach a number of diagrams at Annex 1 setting out different topologies for how fibre unbundling could be used by operators (see diagrams 3 – 8). Ofcom's position to exclude fibre unbundling is inconsistent with the European Commission's position on NGA that encourages Member States to mandate fibre unbundling at the passive layer of the network, "*NRAs should mandate* ***unbundled access to the fibre loop*** *irrespective of the network architecture and technology implemented by the SMP operator.*" [33]

Countries such as the Netherlands and Finland have taken significant steps to deploy NGA networks across their countries. Both mandate fibre unbundling on the incumbent's network which has provided an effective and popular remedy for operators. A number of other EU countries include fibre unbundling as a regulatory obligation on SMP operators, such as Slovenia.[34] These countries are good examples of how a fibre unbundling remedy is effective for network deployment boosting competition in the market.

[32] ECTA Regulatory Scorecard 2009. Report on the Relative Effectiveness of the Regulatory Frameworks for Electronic Communications in Austria, Belgium, Bulgaria, the Chez Republic, Denmark, Finland, France, Germany, Greece, Hungry, Ireland, Italy, the Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, the United Kingdom and Turkey
[33] Ibid 3 page 13, paragraph 20.
[34] NL/2008/0826 and SI/2009/0957.

(ii) Physical Infrastructure Access

We have a number of concerns about the PIA remedy as set out in more detail in our answers to question 9. Firstly we re-iterate our point made above that Ofcom's arbitrary exclusion of business connections is unworkable, difficult to define and will lead to an unfair advantage for BT in the NGA market. This is not consistent with the European Commission's directives on NGA and physical remedies.

PIA is too restrictive

Further, the PIA remedy does not go far enough to allow operators access to, and effective and efficient use of BT's infrastructure, rather it only allows a limited connection between an end user's property and the closest MDF to that property. We set out in more detail on our answers to question 9 why we consider this is problematic and will lead to limited take up, wasted build and civil costs (for an operator to reach that MDF), and less competition in the market. The incentive to deploy competing NGA networks is reduced when an operator is faced with long stretches of network build to connect to a point where it can pick up the PIA remedy. Ofcom should encourage competition and new network build by providing operators access to BT's infrastructure at the closest point to their network. We do not believe that BT should have the advantage of using its own legacy network infrastructure to deploy NGA in a market where it holds SMP while other operators are only offered a limited and insufficient option to use that infrastructure.

Ofcom needs to extend the PIA remedy to other MDF sites on BT's infrastructure. This will stimulate competition and investment in the market and allow operators to compete with BT on a level playing field. The current PIA proposal does not create a level playing field and is inconsistent with the European Commission's position that encourages connection at the most suitable point on the incumbent's network:

"*Where the SMP operator deploys FTTH, NRAs should, in addition to the above remedies, mandate unbundled access to the fibre loop. Such remedy should be accompanied by appropriate measures assuring co-location and backhaul. Access should be given at the most appropriate point in the network, which is normally the Metropolitan Point of Presence (MPoP).*"

Duct capacity

Thirdly, to overcome difficulties with congested ducts or limited capacity, we suggest Ofcom mandate BT offer dark fibre to operator's in those scenarios where PIA cannot be provided. This is similar to the German regulator's approach whereby it requires its incumbent to inform access seekers about the availability of access to ducts or dark fibre and to mandate access to dark fibre between the MDF and the street cabinet when access to ducts is not possible for technical or capacity reasons.[35] Similarly, in 2009, the Spanish regulator adopted final measures in the markets for physical network infrastructure access

[35] DE/2007/0646

and wholesale broadband access with a provision for dark fibre where access to the incumbent's infrastructure is not technically or physically feasible.[36]

The reference offer

Finally we believe BT's reference offer should have been given before it began selling NGA services at a retail level. BT currently has, and will continue to have an unfair advantage in the market on NGA services (just as it did for LLU) until it releases and agrees with industry a satisfactory reference offer. We note the European Commission's view on this is that incumbents should provide reference offers before they begin selling their own services to create a competitive environment: "*NRAs should apply non-discriminatory principles in order to avoid any* ***timing advantage*** *for the retail arm of the SMP operator. The latter should be obliged to update its wholesale offer before it launches new retail services based on fibre to allow competing operators enjoying access a reasonable period of time to react to the launch of such products. Six months is considered a reasonable period to make the necessary adjustment.*"[37]

We urge Ofcom to take swift steps to ensure BT produce a satisfactory reference offer, otherwise competition in the NGA market will continue to suffer.

(iii) VULA

Ofcom are portraying the proposed VULA remedy as an attempt to satisfy mass market CP aspirations to maintain their competitive position in NGA markets, in a way comparable with the use of LLU in a CGA world. Geo is not convinced that this approach will work, not the least because VULA is clearly neither a complete supply-side or demand-side substitute for copper or fibre unbundling, as it does not enable the downstream CP to deploy the technology of its choice at both ends of the physical media, and thereby take full control of system parameters. Ensuring that alternative operators continue to have this ability to differentiate and innovate is essential to preserve and enhance overall welfare. Given that VULA as it is currently understood does not allow independent determination of connection speed and QoS, it cannot be considered an effective substitute for copper loop or subloop unbundling, or fibre loop or subloop unbundling, except where unbundling is not economically viable for the alternative operator concerned. It is also worth noting that it is doubtful that VULA is a valid remedy in Market 4, particularly if it is promoted as an alternative to effective fibre unbundling, as it seems to be by Ofcom. Geo would accept that it might be an acceptable remedy in the WBA Market 5 review but it must be seen as complementary rather than substitutive of "unbundling", to be utilised where appropriate passive remedies are technically unavailable or economically not viable for the alternative operator concerned.

[36] Commission Staff Working Document accompanying the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Progress Report on the Single European Electronic Communications Market (15th Report) {COM (2020) 253} Brussels 25.5.2010 SEC (2010) 630 Final, page 380.

[37] Ibid 3, page 7, paragraph 39.

Further analysis and comments are included in our response to question 10 posed in the Consultation document.

4. Answers to Specific Consultation Questions

Q1: Do you agree with our proposed product market definition? If not, please explain why.

The market definition proposed is broadly in line with the requirements of the EC Recommendation on "Market 4" as it currently stands, and includes copper, cable and fibre, on a nation-wide basis, with BT proposed to be found having SMP, except in the "Hull area". The analysis is complex and not particularly well structured and appears to lead to somewhat perverse conclusions. Most importantly, whilst it recognises there is a difference between CGA and NGA, it concludes that they currently form part of the same market, since a "chain of substitution" exists. Geo strongly believes that this is not the case and that the application of the standard SSNIP test to customers already enjoying the benefits of NGA based services would demonstrate their unwillingness to accept a CGA based "substitute".

Consequently, we would favour an approach that made a clear delineation between CGA and NGA environments, and applied sets of remedies appropriate in each case. It is clear that Ofcom is aiming to carve-out fibre unbundling as a potential remedy, which is in contradiction to the EC's apparent position requiring fibre unbundling in NGA deployment. In addition, while the proposed "VULA" remedy would be likely to enable replication of incumbent services, there are concerns that it would not give downstream CPs the ability to innovate freely; in particular it would likely not enable them to take the lead on speed, which has been a characteristic of altnet-led innovation and competitiveness in the past.

Q2: Do you agree with our proposed geographic market definition? If not, please explain why?

As noted above, we would support a market definition that made a distinction between CGA and NGA. If this is done, it could be argued that the result might have to be different at the geographic level as well, as NGA networks are rolled out. We would agree with this in principle, but do not believe that it would necessarily result in any greater complexity. BT have SMP in the market outside Hull for CGA and they will have SMP for NGA where they deploy it, because of the ubiquity and capability of their network, except, arguably, where other CPs that have first mover advantage establish market dominance before BT has entered.

This does pose a question with respect to VirginMedia. Clearly it is rolling out NGA type services and consequently could be viewed as affecting the market analysis for NGA regions. However, the technology and architecture of cable networks may make the provision of effective and flexible access service

problematic, and there is a question of whether even Euro DOCSIS 3.0 enhanced HFC networks really constitute true NGA, given the limited, shared bandwidth available on any given node.

Q3: Do you agree with our proposals that BT and KCOM have SMP in their respective geographic markets? If not, please explain why.

Geo agrees with this proposal.

Q4: Do you agree with our proposals for the general access requirements that should apply to BT and KCOM respectively? If not, please explain why.

Geo agrees with this proposal.

Q5: Do you agree that Ofcom should impose a new network access obligation on KCOM, that would require it to follow a statement of requirements process to handle requests for new network access in this market? If not, please explain why.

Geo does not have any comments here.

Q6: In relation to LLU, do you agree with the assessment and options set out?

We agree that "Classic" LLU is a well established part of the current access market and forms an important input into the provision of competitive telecoms services. As NGA deployment will take a number of years to complete, its continued provision is vital and it will increasingly need to be complemented by a full range of other regulatory access remedies which are discussed elsewhere.

Q7: In relation to fibre access, do you agree with the potential unbundling arrangements for the different fibre architectures and the positions/options set out given the current and expected future availability of fibre within BT's access network?

We accept the analysis of the potential unbundling arrangements for different fibre architectures. However, we strongly believe that Ofcom is wrong to exclude fibre unbundling as a passive remedy. There are numerous scenarios where CPs could benefit from fibre unbundling on BT's network to deploy NGA networks in a multitude of different scenarios (where there is FTTC, SLU or LLU). We have set out in Annex 1, 6 diagrams showing the different topologies for network deployment (see diagrams 3 – 8).

The European Commission recently released a Progress Report on the Single European Electronic Communications Market 2009 (15th Report)[38]. In that Report the Commission notes that the current market trend towards bundled products is significantly affecting the competitive dynamics, and is creating an additional regulatory challenge, for NRAs. It cites countries such as the Netherlands, Finland, Latvia and Estonia that include fibre in the wholesale broadband market and have imposed obligations on their respective incumbents.

We also note that fibre unbundling is a critical element of regulating the market as set out by the Commission in is draft Recommendation. "*Where SMP operators deploy FTTH, NRAs should, in addition to the above remedies, mandate* ***unbundled access to the fibre loop****. Such remedy should be accompanied by appropriate measures assuring co-location and backhaul."*[39]

The Commission goes even further to stress that the SMP should be required to deploy additional cables to facilitate fibre unbundling and stimulate competition in the market:

"*NRAs should, in accordance with market demand, encourage, or, where legally possible under national law, oblige the SMP operator to deploy multiple fibre lines in the terminating segment.*"[40]

Many EU countries include fibre unbundling as a regulatory obligation on SMP operators. For example, the Dutch (OPTA) and Slovenian (APEK) regulators have put in place measures mandating unbundled access to fibre loops (point to point fibre unbundling).[41] The Belgium regulator (BIPT) also imposes on the incumbent the obligation to provide access to the optical platform at the street cabinet and additional backhaul services (duct access and dark fibre or Ethernet backhaul) in order to make efficient the SLU obligation.[42]

An open access network, at both the passive and active layer is an essential requirement to ensure long-term prospects for sustainable competition in the UK economy. It is also a key requirement for approval under the State Aid Guidelines[43] for any new networks built using public funding. Fibre unbundling is a passive remedy critical for CPs wishing to deploy their own active products with the choice and flexibility over broadband speeds, usage caps and pricing. Access at this level allows CPs to further differentiate their service offering, upgrade and change as the market and technology develops and essentially compete on a level playing field with large vertically integrated players such as BT. The provision of access only to the active products on BT's network is not

[38] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Brussels, COM (2010) final.
[39] Ibid 3 page 13, paragraph 19.
[40] Ibid 3 page 12, paragraph 18.
[41] NL/2008/0826 and SI/2009/0957
[42] BE/2008/0801
[43] Ibid 2.

true open access and it keeps the market captive to the investment profile and technology roll-outs of the incumbent. We believe that greater promotion of the open access business model for NGA fibre roll-out starting with regulation across BT's network is needed if there is any chance of rapid deployment of NGA in the UK, in line with the European Commission's Framework and Recommendation.

As set out above, we strongly believe that fibre unbundling should be an NGA remedy for FTTC, SLU, and where possible LLU. This is consistent with the European Commission's statement that incumbents should be required to update their LLU reference offers as soon as possible to include unbundled access to the fibre loop[44] and the reference offer should be in place as soon as possible.[45] It is apparent that the Commission does not draw any market distinction between the fibre or copper remedy for LLU. On the contrary, it calls NRAs to ensure their incumbents adjust its reference offer to include fibre as soon as it is deployed.

We also note some comments that fibre unbundling is unworkable in situations where BT has deployed a GPON technology. However, we consider that fibre SLU can work in the same way as copper SLU where BT provides a "D-side" ODF in each cabinet that connects the end user fibres. The other CP can then connect to it to gain access to the end users. The CP will install its cabinet next to BT's and be able to provide services to the end users with any technology from point to point fibre, to active Ethernet to GPON without restriction to BT's technology choice of GPON. Just as with copper LLU/SLU, CPs can then innovate and differentiate themselves from others by providing unique fibre based services which are unrestricted by the slow upload speeds seen with copper based services. Fibre SLU will rely on BT deploying its fibre implementations with the same flexibility as its copper implementations. This would be in the spirit of copper unbundling and ensure a BT SMP situation is not inherently created by design.

See the 3 diagrams set out in Annex 1 where we show how fibre unbundling is possible using a GPON architecture (see diagrams 9 – 11).

Fibre unbundling is an essential remedy to create an effective and competitive market place. We set out comments on why we think VULA is an inadequate remedy under question 10 below.

[44] Directive 2002/19/EC.
[45] Ibid 3, page 13 paragraph 21.

Q8: In relation to SLU, do you agree with the assessment and options set out?

Geo is firmly of the view that the current SLU product is not fit for purpose and is arguably unduly discriminatory in BT's favour, since it is not consumed as part of the Openreach FTTC deployment. The Consultation notes the views of some CPs that the current SLU product is deficient. We would fully support this position and note that the deficiencies cover a range of product, process and pricing issues around the current SLU portfolio. Most obviously, the current regime does not offer "active cabinet sharing" which is required to minimize deployment costs, complementing the cost efficiency offered by PIA mandated duct and pole access. In addition, we note in Section 3 of this Consultation response and under question 7, that fibre unbundling (including as part of an SLU remedy) is an essential remedy to allow other operators to compete effectively with BT in the WLA market. We believe that Ofcom is wrong to exclude fibre unbundling for SLU remedies and that this is inconsistent with the European Commission's position that recommends fibre unbundling within an SLU remedy: "*NRAs should adopt appropriate backhaul measures to make any sub-loop unbundling remedy effective. Access seekers should be able to select the solution best fitting their requirements, whether dark fibre (and where relevant copper), Ethernet backhaul or duct access.*"[46]

The provision of the SLU remedy for copper was welcome; however, a major reason for the low take up is due to the proximity issues for operators trying to connect to BT's network (highlighted in Section 3, part (d)(ii) of our Consultation response). The likelihood of a CP having close proximity to BT's cabinets in any reasonable volume is too low to justify the infrastructure spend required to connect and acquire local access to customers. This situation will remain unless the definition of local access is local from the CP standpoint as well as BT. This means the removal of the restrictive terminology of access and backhaul which are better suited to active bit stream networks and not infrastructure. The BT infrastructure does not have a demarcation between what is used for access and what is used for backhaul. We have said in detail in our Consultation response, that Ofcom's definition of "local access" should be the connection between the closest PoP to the end user whether it is via BT's network or not. By adjusting this definition, a CP with a PoP that is 30km from the end user has access to the same remedies as a CP whose PoP is within 500m of the BT PoP servicing the same end user. Under the current system, BT has a significant advantage and hence SMP. If the definition was amended, SLU will become more attractive as it will mean the proximity cost differential is greatly reduced.

Notwithstanding these major product element omissions, there are a number of product and pricing deficiencies with the elements that are defined that make SLU unsuitable as the basis for any significant service delivery that would be

[46] Ibid 3 page 7 paragraph 35.

competitive with BT's own downstream offerings. The most obvious issue is that the SLU remedy is not part of the "Equivalence of Inputs" regime (EoI). EoI was designed to ensure that BT could not consciously or otherwise unduly discriminate in favour of its own downstream businesses when providing WLA type input to them and other CPs. We fail to see why SLU is not included as it appears that BT is clearly not consuming SLU as an upstream input into its own NGA deployment whilst forcing other CPs to endure a number of product, process and pricing handicaps from the current SLU reference offer, which clearly constitutes discriminatory behaviour:

- PCP Survey - each PCP has to be surveyed prior to SLU service initiation. Each survey is charged at a standard price of £350 and the Openreach price list notes that up to 5 surveys can be completed per day. There is no discount applied if multiple surveys can be carried out in the same day, despite the obvious likely reduction in travel time and costs. In the context of any large scale project we would expect a further project related discount, to reflect the elimination or reduction of common elements in the one off charge.
- PCP chamber "break-in" costs – Openreach insists on undertaking this activity itself and will not provide any facility for third parties to undertake this activity as part of their network construction programme. There should be an option of the use of a third party contractor to undertake this activity, to an agreed specification. Openreach's inflated £600 charge has a material impact on network construction costs. The charge is unreasonable, based on benchmarking data from industry contractors, and the work could be done more efficiently by the CP's contractors, taking SLU as a part of overall new network construction, to agreed standards with minimal supervision by Openreach.
- PCP copper "tie cable" – this connects the Openreach PCP to the CP cabinet and currently is chargeable as a minimum 100m length. The product specification should include a variable to the cable length as installations will generally be significantly shorter.
- End user connections – the process assumes a single customer is provisioned in isolation with no allowance for the savings that will result from multiple customers being provisioned on the same or adjacent PCPs at the same time. Openreach will achieve significant costs savings by the efficient deployment of resources to undertake multiple connections to one or 'adjacent' PCPs in a single visit. Openreach should provide a discount structure commensurate with these efficiency savings. The charge levied per connection is £127.61. This seems to bear no relation to the input costs imputed in the connection charges for Openreach's GEA bitstream service.
- SLU connection and maintenance processes – despite an original commitment to include SLU within the EMP automated gateway for ordering and maintenance activity, there is still no visibility of when this will occur. This is likely to result in CPs having to rely on essentially manual order and repair processes for a period of time which will increase costs and will put them at a

considerable disadvantage in the market against both current generation and GEA based broadband, which are based on automated processes.

- Service harmonisation – the integrated approach to in-life service management has not been applied to SLU, despite its application to FTTC GEA with the absence of a "Level 4"/Enhanced Care capability again putting CPs at a competitive disadvantage.
- LLU to SLU migration – within the SLU product set there is no product specification for the migration of existing LLU users to SLU, either with their existing CP or with a new service provider. This will add to the difficulty in ISPs taking up the competitive offering of other infrastructure providers' next generation services in favour of staying with existing Openreach services resulting in economic disadvantage to them.
- Full Metallic Path – Product Issues; most CP's experience to date has been with Openreach's Shared Metallic Path (SMPF) products. However, in order to provide full compatibility with current LLU based competitive models and to provide maximum opportunity for effective service differentiation, Full Metallic Path (MPF) services must be provided. There are no processes currently in place to order, deliver or service these products.

In the absence of explicit EoI obligations, there are concerns that Openreach may indulge in such unduly discriminatory behaviours with respect to how it designs and prices inputs for other CPs against those it consumes itself. Consequently, we would propose that, at the very least, it is obliged to publish an internal reference offer for those "SLU like" services it consumes itself, so that products, processes and pricing are transparently available for comparison against SLU and PIA to identify potential undue discrimination or anti-competitive practices.

Q9: In relation to PIA, do you agree with the proposed PIA obligation structure and the proposed implementation arrangements?

We believe that excluding the use of the PIA remedy for the deployment of NGA solutions for business connections is unworkable and inconsistent with current WLA remedies (such as LLU). It is also inconsistent with the European Commission's approach to passive remedies that does not draw such distinctions. The European Commission's recent Communication on the Digital Agenda, encourages Member States to legislate and mandate passive remedies to facilitate NGA network deployment and to achieve consistency with the State Aid Guidelines. We have noted that the FibreSpeed network was approved by the Commission under, and is frequently cited in, the State Aid Guidelines but under Ofcom's current PIA proposal, it would exclude the PIA remedy for such network deployments. This is not consistent with what the Commission calls Member States to implement in relation to PIA and will limit and damage the roll out of NGA networks in the UK.

Further we do not believe the PIA remedy goes far enough in relation to mandating access to BT's infrastructure. As set out earlier in our response, the European Communication on the Digital Agenda and the draft Recommendation (due to be released this summer), stipulates that Member States should give access to all of the incumbent's infrastructure in not just the access network but also the backhaul. In order to create efficiencies, avoid wasted duplication of resources and allow operators the choice to design and deploy the most effective NGA network models, Ofcom must extend the PIA remedy to the most suitable MDF site, nearest to the operator's network (see our comments under Section 3 part (d)(ii)). It can be seen from recent NGA deployments that networks built in isolation generally fail. Successful NGA networks must connect the access and the backhaul network. If the remedy is not suitably extended in this way it will not be effective and will not have the desired results being to reduce costs for NGA roll out and increase take up and competition in the market. We have stated in detail in our response to question 8 that limiting the remedy will not have desirable results and will likely lead to poor take up and ineffective use of PIA. Unless a CP's network is very close to BT's MDF it might not justify any desired NGA deployment (due to large stretches of build required to reach the access point).

Our position is consistent with the European Commission in its draft Recommendation. The Commission's statement below shows it supports connection at the passive layer, including backhaul, and that access should be at the most efficient part of the network.

"*In a Fibre to the Home (FTTH) context, duplication of the terminating segment of the fibre loop will normally be costly and inefficient. To allow for sustainable infrastructure competition, it is therefore necessary that access be provided to the terminating segment of the fibre infrastructure deployed by the SMP operator. To ensure efficient entry, it is important that access is granted at a level in the network of the SMP operator which enables entrants to achieve minimum efficient scale to support effective and sustainable competition. Where necessary specific interfaces could be required to ensure efficient access is gained.*"[47]

"*Where the SMP operator deploys FTTH, NRAs should, in addition to the above remedies, mandate unbundled access to the fibre loop. Such remedy should be accompanied by appropriate measures assuring co-location and backhaul. Access should be given at the most appropriate point in the network, which is normally the Metropolitan Point of Presence (MPoP).*"

We strongly feel that BT already has an unfair advantage and head start in the industry in relation to NGA. BT's reference offer should have come before (not

[47] Ibid 3 page 4, paragraph 16.

after) it released its own NGA retail products in the market. As stated by the European Commission:

"*NRAs should apply non-discrimination principles in order to avoid any timing advantage for the retail arm of the SMP operator. The latter should be obliged to update its wholesale offer before it launches new retail services based on fibre to allow competing operators enjoying access a reasonable period of time to react to the launch of such products. Six months is considered a reasonable period to make the necessary adjustment.*"[48]

We fully support Ofcom's proposal for the OTA to facilitate workshops with BT and industry to kick start considering the contents of the PIA reference offer before the formal reference offer is released and that such pre-work will shorten the formal regulatory process. We also suggest that the current BSG PISWG product outline (see Annex 2) and the WLA review requirement be used by the OTA as the basis of a statement of requirements (SOR) definition for discussion. This should also accelerate the timetable to completion of the reference offer. We note the OTA's presence at the BSG handover of the PISWG work to Ofcom and that it was in support of such a work stream.

Geo believes that the work done by PISWG shows that some of the operational challenges identified by Ofcom should not be as onerous as implied. Consequently, the timetable for reference offer preparation seems excessive, particularly if industry can engage effectively with BT in the near term on a collaborative basis to maintain momentum. The work done and the BSG's findings are attached to this document at Annex 2.

We note Ofcom and other industry concerns about the quality of BT's ducts, limited capacity and congestion. Quite simply, there is only a finite amount of space in BT's ducts and the operator that gets to use it first should not be allowed to deny access to the rest of the market. On the other hand, as Geo can testify, leasing this capacity to others in the market is an attractive business and one which, with the appropriate attention to the creation of fibre leasing reference offers from BT and others, can remove many of the concerns about duct and pole access. Let the company who chooses to invest first enjoy the returns from its investment – but do not allow it to prevent the rest of the market from accessing this new network.

Many countries have implemented the PIA or similar passive remedies and these problems can be easily overcome. We suggest that Ofcom consider the German regulator's approach to duct access, which is to require fibre leasing in those cases where duct access is not available. The German regulator (BNtezA) requires its incumbent to inform access seekers about the availability of access or ducts or dark fibre and to mandate access to dark fibre between MDF and the street cabinet when access to ducts is not possible for technical or capacity

[48] Ibid 3, page 7, paragraph 39.

reasons.[49] In its review, the European Commission also commented on the fact that alternative operators should be given the opportunity to access dark fibre in circumstances where there is still free capacity in the duct and asked BNetzA to clarify that the remedy imposed covered both in and at the street cabinets. Another example of where leasing dark fibre can overcome issues with limited duct capacity is in Spain. In Analysis Mason's Final Report for Ofcom on Operational Models for shared duct access[50] it notes that, in Spain, where congestion occurs and no alternative path can be found, Telefonica has to investigate the possibility of removing its unused cable to free up some capacity and if no cables can be removed, investigate the feasibility of providing dark fibre to the CP in the congested areas.

Consequently, we would suggest that it is vital that PIA is complemented by some form of "dark fibre" obligation where available duct or pole space is limited. As PISWG suggest, where there is limited capacity in a duct, it should not be given out on a simple "first come first served" basis. Rather than limit overall operator access to the duct for PIA, there should be a requirement in such circumstances that Openreach install fibre in the remaining capacity and lease the fibre strands to operators. Alternatively, the first operator who takes PIA must lease fibre in that duct to other operators.

We also believe that BT should be required to provide a reference offer for a complete passive access service. We note this requirement is also prescribed by the European Commission in its draft Recommendation, where its states "*The SMP operator should implement the procedures and tools necessary for efficient access and use of its civil engineering infrastructure and distribution points, and the different elements the infrastructure consists of. In particular, the SMP operator should provide third party access seekers with end to end ordering, provisioning and fault management systems equivalent to those provided to internal access seekers. This should include measures aimed at de-congestioning currently used ducts.*"[51] As set out above, we felt the work done by the PISWG group is consistent with the European Commission's position and an excellent starting point for BT's reference offer. We fully support Ofcom's initiative for the OTA to facilitate these meetings. We have attached the PISWG findings on duct access at Annex 2.

Finally, careful consideration needs to be given to the pricing methodology adopted for PIA. Pricing needs to be cost oriented and, in principle, we would support the application of an appropriately applied "LRIC+" regime. However, the allocation of "joint and common costs" between PIA and downstream Openreach services needs to be carefully considered – to what extent are they "common"? In addition, some degree of constancy in pricing over time must be maintained, even in the light of a changing service mix, in order to provide investment

[49] DE/2007/0646
[50] Final Report for Ofcom. Operational Models for Shared Duct Access 1 April 2010 Ref: 16873-135a
[51] Ibid 3 page 21, paragraph 3.

certainty. In parallel with the preparation of the reference offer, Ofcom should investigate and consult on the best approach to price setting for PIA.

In the Analysys Mason report noted above, the following recommendation is made "*Overall, we believe that an operational model that includes all the features specified in our recommendations should result from an iterative process, involving the feedback of all UK stakeholders. However, we recognise that it may not be feasible to implement all functionalities in the initial development of the operational model, because doing so may delay the introduction of the duct and pole offer, and would involve a significant upfront capex investment by the industry. Instead, an incremental approach should be adopted, each developmental stage drawing on the experience of both Openreach and communication providers (CPs) of earlier stages. In order to facilitate the incremental development of the operational model, we recommend monthly meetings between the Openreach, the CPs and the regulator to provide feedback on operational issues and provide input into how the model could be improved.*" We would wholeheartedly concur with that approach and welcome Openreach's recent announcement of a series of workshops to start this process prior to the conclusion of the Consultation.

Q10: In relation to VULA, do you agree that VULA may be a necessary access remedy in the WLA market and if so, do you agree with the key characteristics identified and how these currently relate to BT's GEA products?

VULA can best be described as raw Ethernet bitstream with hand-over at the first aggregation point, and offering the downstream CP the maximum transmission capacity determined by the incumbent (over VDSL2, GPON, and perhaps other technologies). Ofcom are portraying this remedy as an attempt to satisfy mass market CP aspirations to maintain their competitive position in NGA markets.

Such alternative CPs are primarily concerned with maintaining and enhancing their ability to compete with dominant operators and have indicated that obtaining "virtual unbundling" is absolutely crucial for them, as effective and fit for purpose access of this kind could mitigate the serious risks they are exposed to in the context of BT's transition to NGA (as VDSL2 is being rolled-out by BT on a wide scale, and the BT GPON roll-out is expected to gain scale at a slower pace).

However, VULA is clearly neither a complete supply-side or demand-side substitute for copper or fibre unbundling, at the very least because it does not enable the downstream CP to deploy the technology of its choice at both ends of the physical media, and thereby take full control of system parameters. Whilst Ofcom identify that direct control in particular of the speed and QoS parameters is ideally required, it notes that they are not currently available and, in Geo's

view, are unlikely to be easily made available in any meaningful sense on BT's current network architecture. We understand that discussions are also still underway as to whether GEA/VULA would be priced at a single monthly access fee, or with differential pricing depending on speed. Clearly, differential pricing by speed would undermine any argument of substitutability with unbundling.

The effective control of connection speed and QoS independent of the access infrastructure provider has been an essential driver of innovation and competition in consumer and business markets for many years. LLU based altnets and other non-incumbent CPs have led the market in providing customers with higher speeds and quality to differentiate their offerings from those of the incumbent operator, whose natural inclination is to attempt to constrain speeds and quality or attach very high price premiums to higher speeds and higher quality. This independence has driven consumer download speeds from 256k to 24-28 Mb on the legacy copper network in the past decade. It is also this independence, which allowed the first Ethernet offerings to emerge for business customers on altnets own fibre infrastructure and also using ShDSL and e-ShDSL over single pair-bonded unbundled loops.

Geo understands that Ofcom has genuinely tried to take into account the impact that the roll-out of BT NGA (VDSL2 and GPON) will have, including assessing the ensuing risks to competition based on current forms of network access. In particular, the fact that copper unbundling alone might no longer be an adequate platform for competition going forward has clearly been recognised and an attempt has been made to develop a regulatory remedy regime that will continue to sustain effective retail competition. However, the conclusions reached seem to have been unduly influenced by the view that incumbent investment incentives would be adversely affected by the proper and effective application of the EU Framework. This has led Ofcom down a "compromise" path, which has led them both to re-interpret the scope of Market 4 and which remedies are appropriate. This has apparently precluded the obvious approach of fibre unbundling and favoured the choice of GPON network architectures that are not intrinsically open nor sufficiently "future proof" for longer term needs.

Geo believes such compromises are dangerous and, in this case, seem to be based on a regulatory perspective that appears to be seeking a particular market outcome, with little or no real "infrastructure based" competition. We believe that this is dangerous and unwarranted, and that a new "ladder of investment" based approach to regulation needs to be developed. In our view Ofcom should apply the EU Framework, with the explicit principle that physical unbundling (copper loops, copper sub-loops, fibre loops, fibre sub-loops) should be mandated irrespective of the network architecture and technology implemented by the SMP operator where SMP is found on Market 4.

However, we would accept that the sector is faced with an inevitable transition of dominant operators' networks to NGA, and that justifies some flexibility in framing appropriate regulatory remedies. In this context, it may well be that

VULA has a role to play as an active remedy complementing a passive remedy of genuine fibre unbundling, where that represents the only economically viable approach. We would question whether it should be a Market 4 or Market 5 remedy, particularly since the effective exit of Orange from the LLU based broadband access market in the light of their outsourcing deal with BT would appear to invalidate Ofcom's WBA market analysis. We would note that, in our view, CGA and NGA access and broadband service markets do not constitute a real "chain of substitution" in any event, for the reasons stated earlier, which suggests that the Market 5 analysis is not valid for NGA in any event.

Q11: Do you agree with the framework for considering specific access remedies on BT?

In broad terms, yes.

Q12: Do you agree that there is a need to have a complementary set of access remedies and if so, do you agree with the proposed set of remedies on BT?

As noted in our response to the previous questions, we believe that Ofcom need to construct a set of remedies that more accurately reflect the behavioural and economic dynamics of NGA based service consumption and deployment. The absence of an effective fibre unbundling option and a complete PIA remedy means that the NGA "ladder of investment" is incomplete and the chances of maintaining effective competitive intensity will be much diminished. Only the creation of a truly "open access" regime with SMP triggered access remedies available at all points in the NGA supply chain will ensure that effective and sustainable competition develops, network investment and deployment are accelerated and welfare benefits maximised.

Q13: Do you agree that no specific access remedies should be imposed on KCOM in the WLA market at this time? Could any remedies on KCOM at the WLA market address the competition issues that we have identified?

Geo has no comments on this issue.

Q14: Do you agree with our assessment against the legal tests for each specific remedy as set out in Section 9?

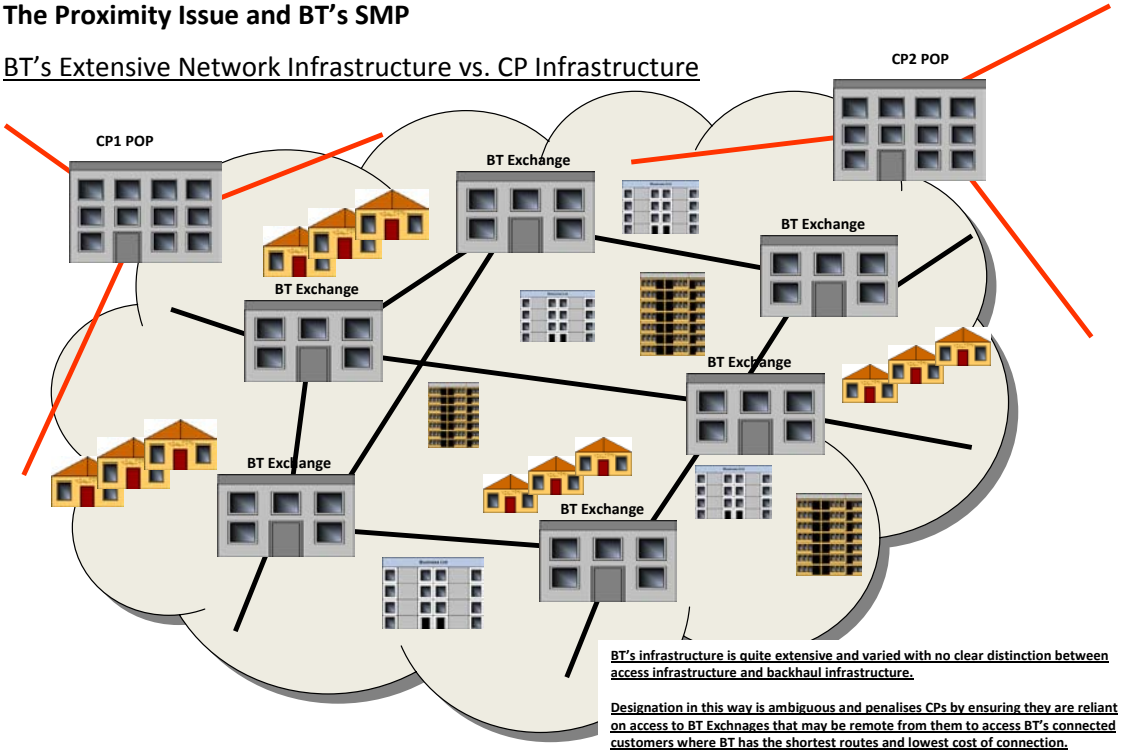
Yes

ANNEX 1

Diagram 1 – The Proximity Issue

The Proximity Issue and BT's SMP

BT's Extensive Network Infrastructure vs. CP Infrastructure



BT's infrastructure is quite extensive and varied with no clear distinction between access infrastructure and backhaul infrastructure.

Designation in this way is ambiguous and penalises CPs by ensuring they are reliant on access to BT Exchnages that may be remote from them to access BT's connected customers where BT has the shortest routes and lowest cost of connection.

Access to infrastructure at all reasonable points reduces this SMP and allows CPs to make more granular business cases and drives competition and innovation to all wholesale access customers.

Diagram 2 – NGA Networks

Wholesale Local Access Products for Fibre – "Consumer" and "Access" Only??

Near Impossible to Police Application of Product Rules left to BT to Designate!

•The use and designation of duct infrastructure should be unbiased to bring CPs closer to their end users

•Backhaul/Access demarcation is virtual and works for wholesale bit stream access but limits the effectiveness of any wholesale infrastructure access product remedies proposed. It also raises difficult questions on the ability to define and regulate……..

•Which ducts and fibres are consumer only?

•Which ducts and fibres are backhaul and not access and therefore condered to be outside the wholesale local access market?

•Can a CP or BT connect 200 businesses and 1 home and therefore be compliant?

•Will BT or a CP be penalised for deploying a NGA network that can support both business and consumer services over BT infrastructure where it is a business broadband network and then expand to homes at a later date?

•How does a CP distinguish a small business run from a residence from a home worker with corporate LAN access and to which use does this apply?

"Continued limitation of access by applying virtual rules will impose a newly entrenched BT SMP in the wholesale access market for fibre based networks"

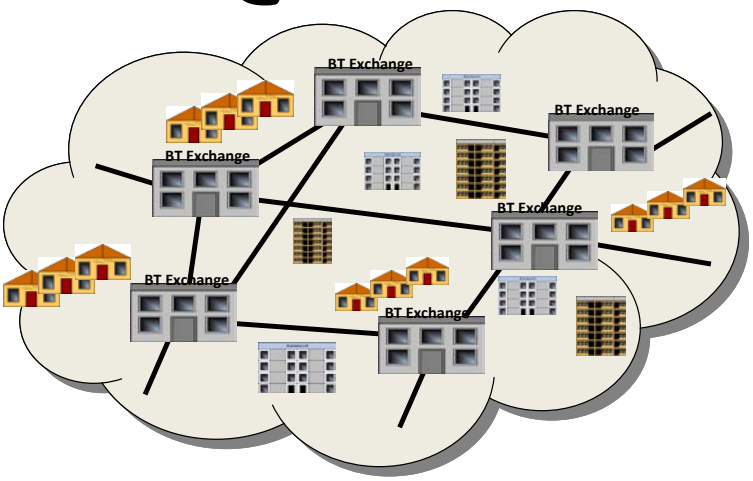
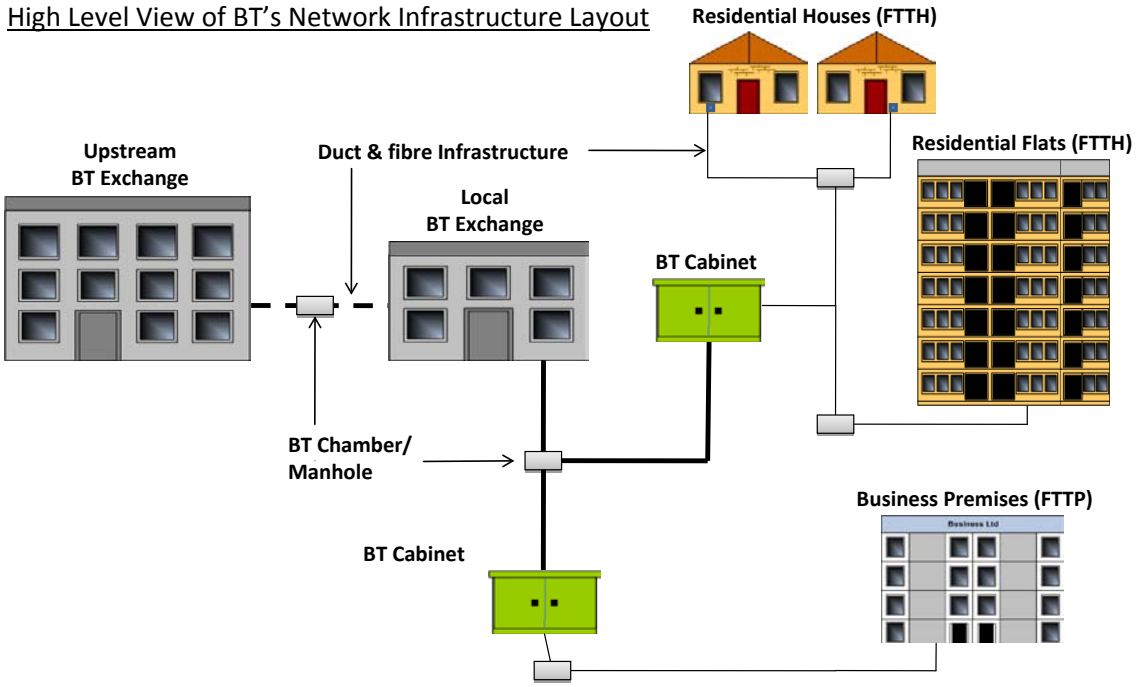


Diagram 3 – Deployment Topology (1)

Connectivity Scenarios for Communication Providers (CP)

High Level View of BT's Network Infrastructure Layout

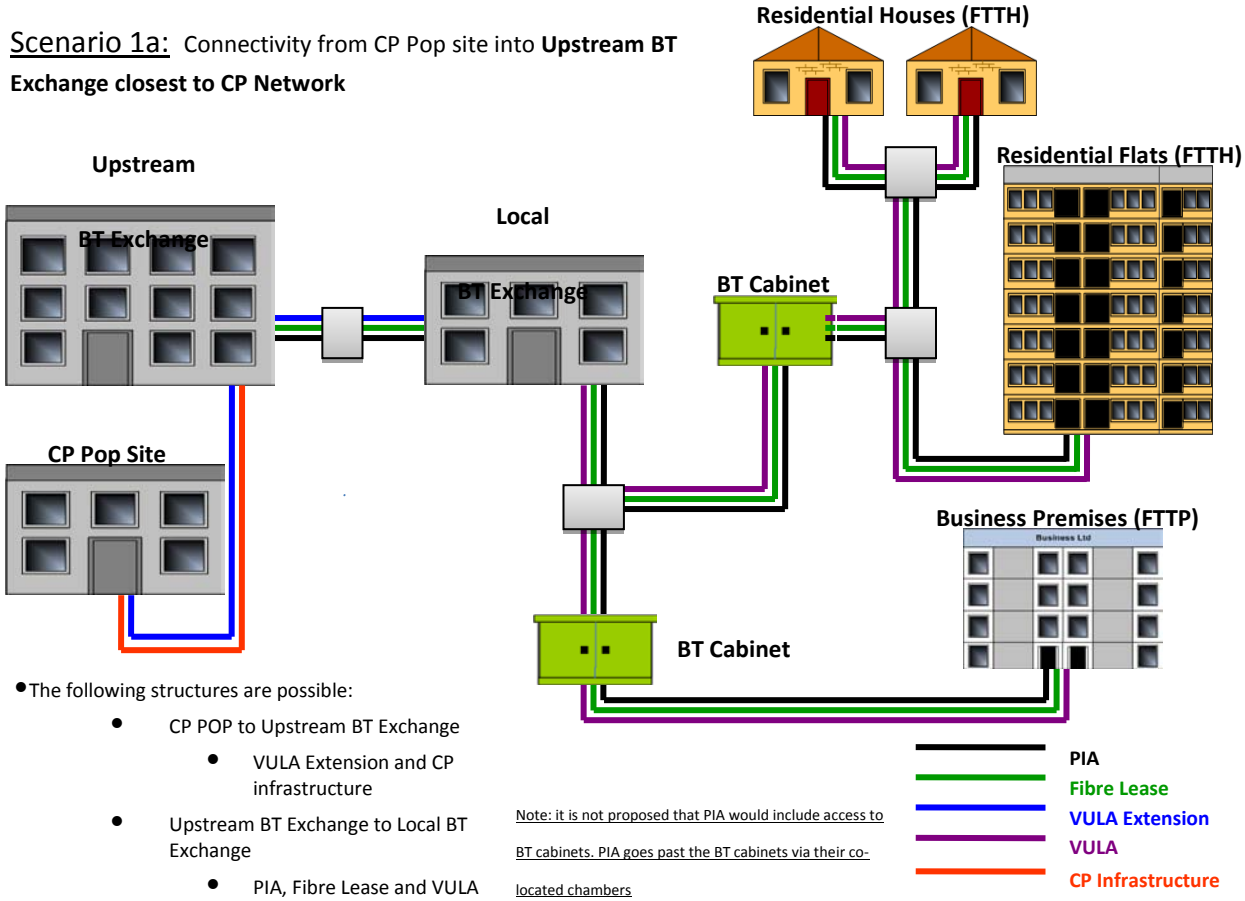


Note: the existence of a cabinet between local exchange and end user is assumed for simplicity. It is assumed BT's current co-location services will be provided in exchanges where required.

Diagram 4 – Deployment Topology (2)

Connectivity Scenarios for Communication Providers (CPs)

Scenario 1a: Connectivity from CP Pop site into **Upstream BT Exchange closest to CP Network**



- The following structures are possible:
  - CP POP to Upstream BT Exchange
    - VULA Extension and CP infrastructure
  - Upstream BT Exchange to Local BT Exchange
    - PIA, Fibre Lease and VULA Extension
  - Local BT Exchange to End User
    - PIA, Fibre Lease and VULA

Note: it is not proposed that PIA would include access to BT cabinets. PIA goes past the BT cabinets via their co-located chambers

Diagram 5 – Deployment Topology (3)

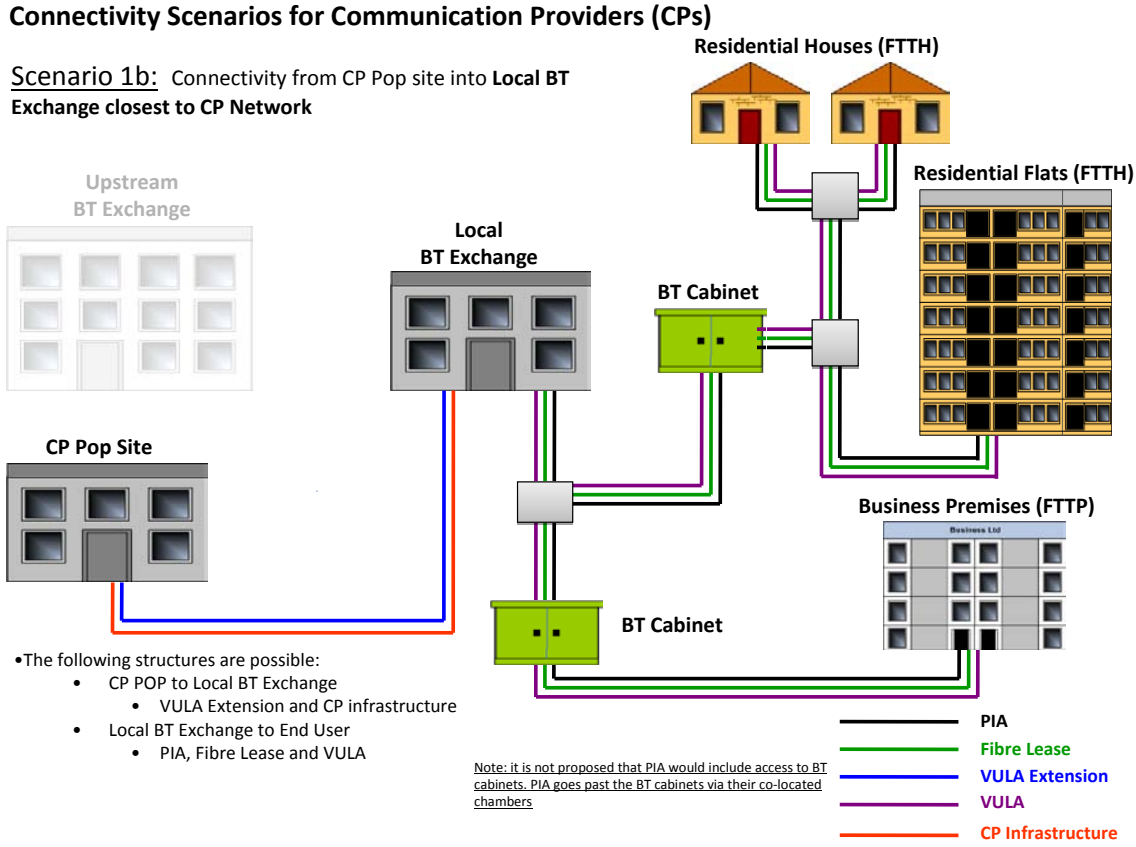


Diagram 6 – Deployment Topology (4)

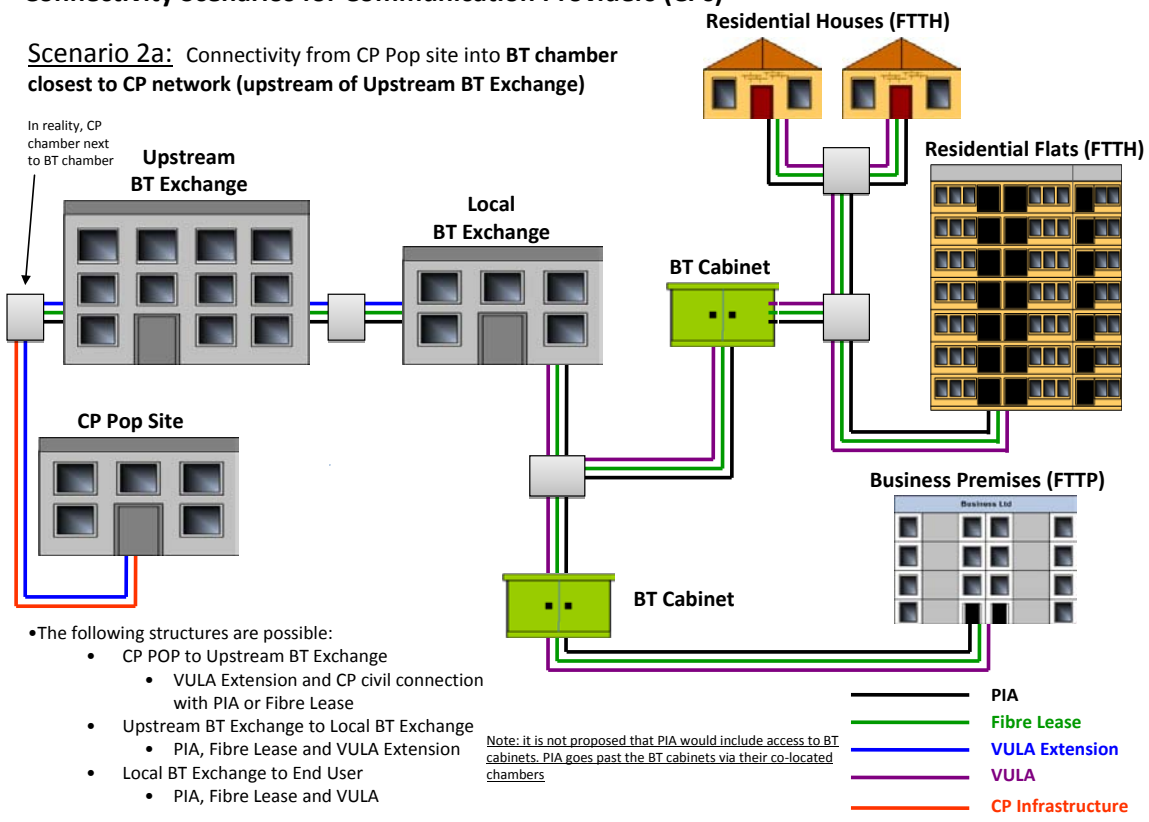
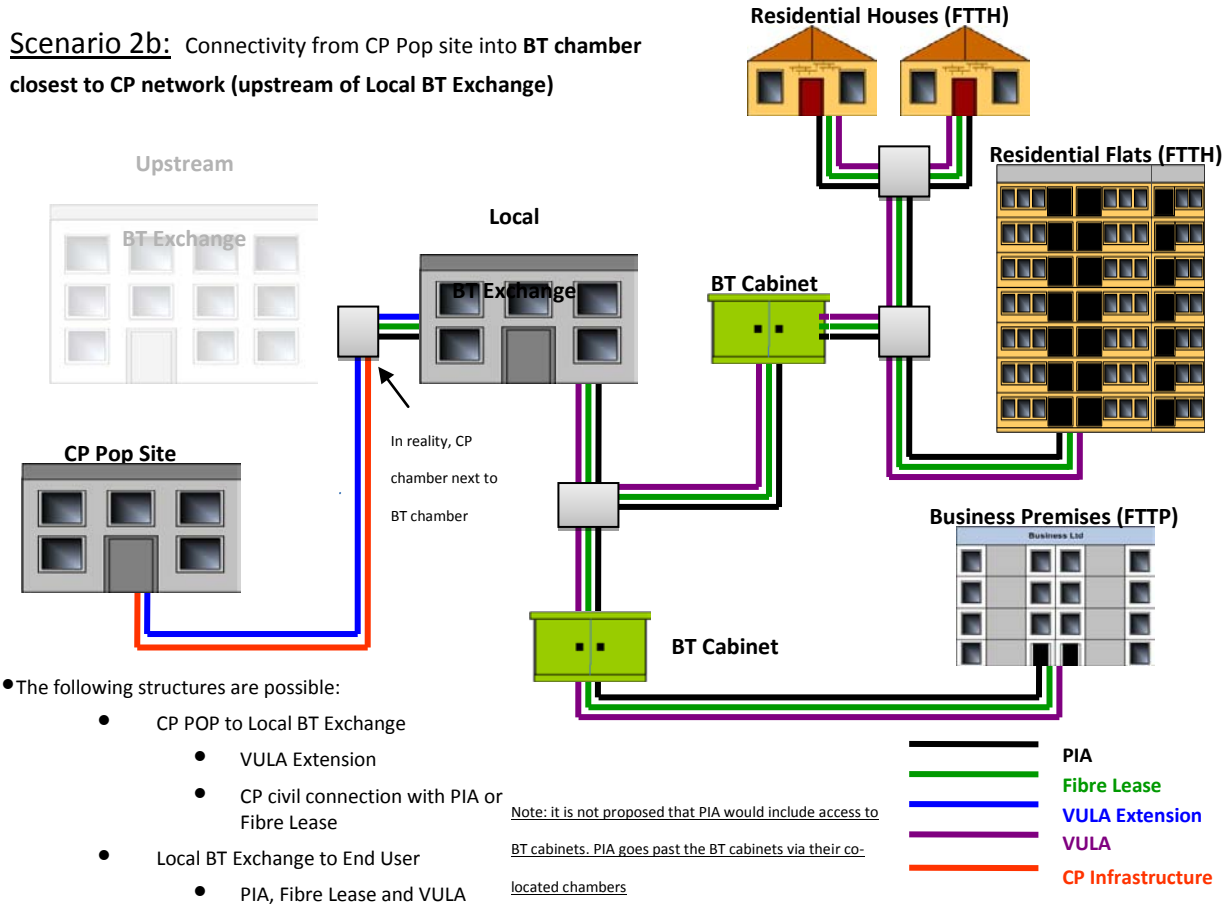


Diagram 7 – Deployment Topology (5)

Connectivity Scenarios for Communication Providers (CPs)

<u>Scenario 2b:</u> Connectivity from CP Pop site into **BT chamber closest to CP network (upstream of Local BT Exchange)**



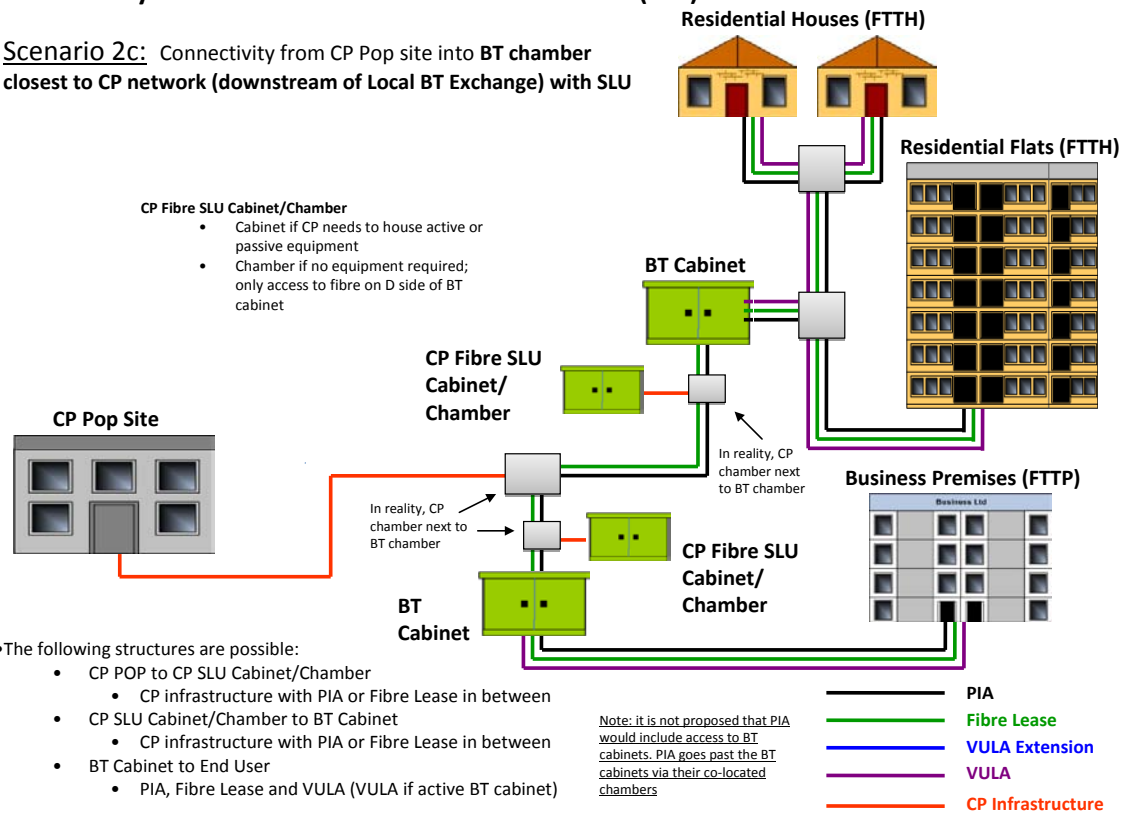
- The following structures are possible:
  - CP POP to Local BT Exchange
    - VULA Extension
    - CP civil connection with PIA or Fibre Lease
  - Local BT Exchange to End User
    - PIA, Fibre Lease and VULA

<u>Note: it is not proposed that PIA would include access to BT cabinets. PIA goes past the BT cabinets via their co-located chambers</u>

Diagram 8 – Deployment Topology (6)

Connectivity Scenarios for Communication Providers (CPs)

Scenario 2c: Connectivity from CP Pop site into **BT chamber closest to CP network (downstream of Local BT Exchange) with SLU**



•The following structures are possible:

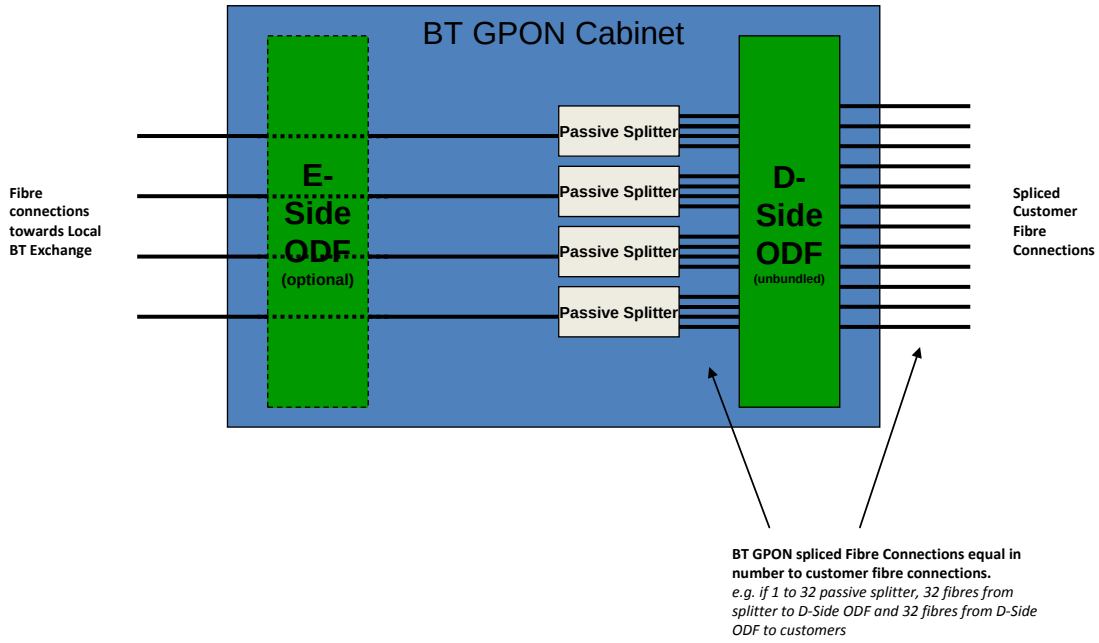
- CP POP to CP SLU Cabinet/Chamber
  - CP infrastructure with PIA or Fibre Lease in between
- CP SLU Cabinet/Chamber to BT Cabinet
  - CP infrastructure with PIA or Fibre Lease in between
- BT Cabinet to End User
  - PIA, Fibre Lease and VULA (VULA if active BT cabinet)

Note: it is not proposed that PIA would include access to BT cabinets. PIA goes past the BT cabinets via their co-located chambers

Diagram 9 – GPON Fibre Unbundling (1)

Proposed BT Cabinet Structure for GPON "SLU" fibre unbundling

(representative view for illustration)



BT GPON spliced Fibre Connections equal in number to customer fibre connections.
e.g. if 1 to 32 passive splitter, 32 fibres from splitter to D-Side ODF and 32 fibres from D-Side ODF to customers

Diagram 10 – GPON Fibre Unbundling (2)

Proposed BT Cabinet Structure for GPON "SLU" fibre unbundling

(representative view for illustration)

Scenario 1: Connectivity from **CP cabinet into "SLU'ed" BT GPON Cabinet**

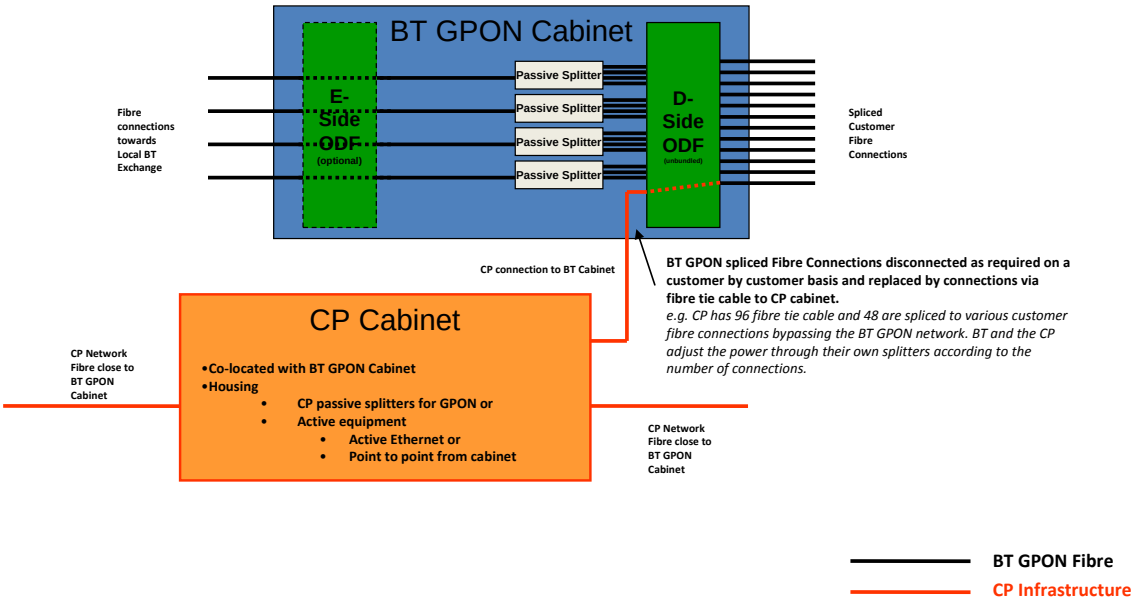
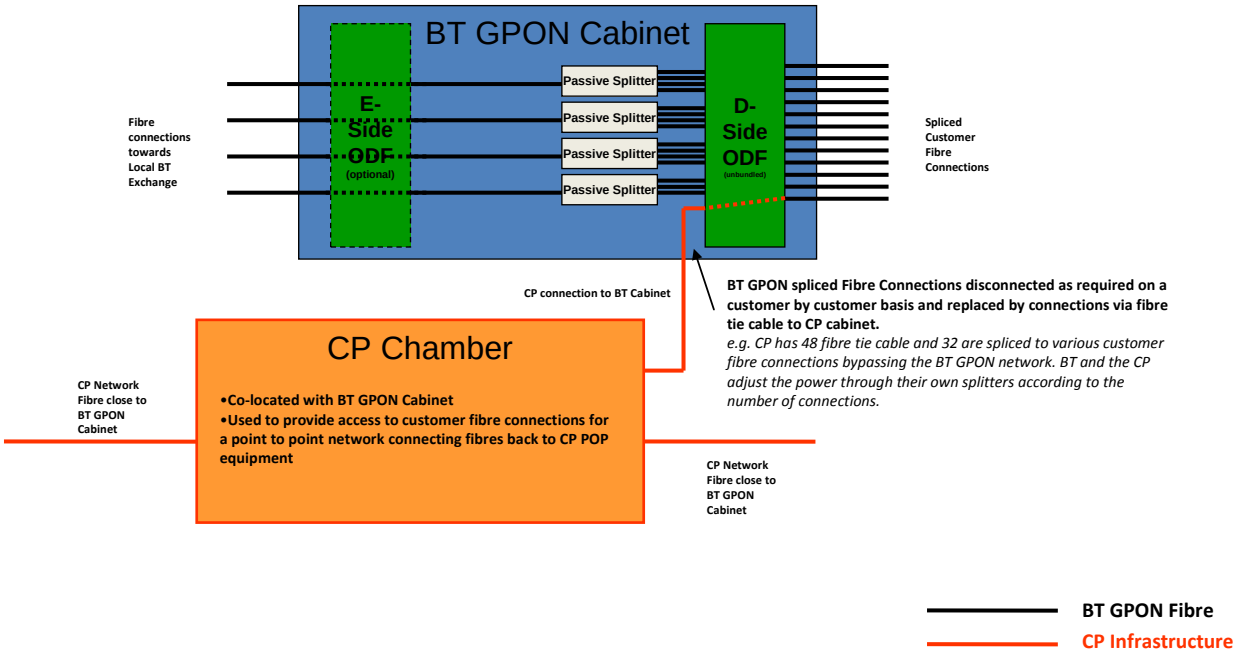


Diagram 11 – GPON Fibre Unbundling (3)

Proposed BT Cabinet Structure for GPON "SLU" fibre unbundling

(representative view for illustration)

Scenario 2: Connectivity from **CP Chamber into "SLU'ed" BT GPON Cabinet**



ANNEX 2

BSG - Outline Requirements for a Network Element "Passive Access" Product Set

Introduction

The BSG PISWG is examining the opportunity for the reduction of NGA deployment costs by exploiting relevant existing "network" infrastructure through some form of commercially agreed or regulatory intervention mandated sharing.

This document outlines an initial draft requirements specification of a suitable "passive access" product set. In practice, this involves a number of products that could be required and used in a variety of combinations, depending on the route and the operator's requirements. The product set below also includes elements that would address the information needs of an operator for them to be able to make an informed decision regarding the economic/commercial viability of their proposed use of shared infrastructure. This specification is at a top level, and a number of issues would need to be resolved and further work undertaken to develop this. It is expected that all products here would be underpinned by SLAs and SLGs, including appropriate timescales for provision of each product.

This is intended to be generic to any passive infrastructure, but has focused initially on Openreach's network as a starting point, given the likely central role that Openreach would play in this market, the network's ubiquity and the availability of information regarding its infrastructure and existing products and services.

Where new infrastructure is required due to a lack of available space, there are a number of issues that need to be resolved by industry. These will be considered in a further paper looking specifically at the provision of new passive infrastructure.

In order to derive the product set out described, the following assumptions were made.

- A passive infrastructure-sharing product set should be based on a requirement for 'efficient use' of existing infrastructure.
- Any product set should seek to minimise disruption caused by civil works, and disruption to end-users. Minimising the amount of civil works would also reduce the carbon footprint of infrastructure sharing.
- Operator cooperation will be required, and will be an important enabler of effective passive infrastructure sharing arrangements. Opportunities for cost-sharing should be built in to the product set to aid cooperation, efficient use and to minimise disruption.
- No estimations concerning cost have been made for these requirements; they represent a wishlist from CPs. A number of these requirements may need to be revised in light of an examination of the costs involved in meeting them and the practicalities of providing services to address them. Further work would need to be undertaken to explore the various options and requirements set out here.
- Where possible, the product set should build on existing products offered by Openreach and BT Wholesale as part of their regulated wholesale portfolios, and existing standard industry practices.
- Operators will want flexible access points along a route.
- A number of corollary issues, such as permitting new overhead distribution and providing greater certainty regarding wayleaves, would need to be resolved in order to maximise the usefulness of

passive access products. These are highlighted below; responsibility for resolving these issues lies with government and the regulator, with input from the industry.

Product set

Initially, operators would be concerned with establishing the feasibility of infrastructure sharing in any given location, and analysing the impact on their business case of doing so. In order to do this most efficiently, it is envisaged that a three stage process be developed, each step providing a greater level of detail and certainty than the previous one.

Stage 1 – Initial information gathering/planning

- The first stage would be an initial review by the operator of the area in which they intend to explore either utilising duct access or through pole attachment. This would be based on information made available by the infrastructure operator at a high level. This stage would enable operators to identify whether there are routes in the area that could potentially meet their needs.
- Existing products and services such as Openreach's Maps by Email,[52] or Linesearch.org,[53] provide a useful basis for this stage, providing information regarding underground or overground routes (duct lengths, approximate locations of joint boxes, PCPs, pole locations, and other plant information).
- These would need to be developed in to a fit-for-purpose tool; this would include agreements regarding the maintenance and upkeep of these records, including recording information regarding work undertaken in an area, when, and by whom, and the easy online availability of information to match the proposed network footprint being considered.
- However, all information would be provided with appropriate disclaimers regarding the accuracy of existing records.
- It may also be pertinent to record areas that have been previously surveyed by an operator, along with a process for contacting that operator – this is developed below in the discussion of a survey product.
- Security considerations mean that access to this information may be limited. A useful condition may be to restrict access to those with Code Powers or equivalent street works authorisation, although this will need to be considered in light of the needs of new entrants and community broadband operators.
- Similarly, it may be necessary for operators to edit the information that is made available, to ensure security and privacy requirements are met. Openreach's security category classifications for 21CN may provide a useful example on which to basis any requirements.
- There remains an issue of how data regarding infrastructure owned by non-traditional infrastructure providers, such as community groups, is recorded.
- The level of information available should allow an initial network deployment plan to be developed, based on assumptions on the potential for network re-use in the footprint, providing an estimate of overall network economics for a first pass business case.
- A period of time should be permitted for operators to provide an indication of intent to progress to stage two for a given area to other operators. Such a process would enable operators to share costs at stage two, and potentially stage three, should an area have interest from multiple operators. Some form of clearing house for registering interest in an area may assist with such a process.

[52] http://www.openreach.co.uk/orpg/networkinfo/locatenetwork/mapbyemail.do
[53] http://www.linesearch.org

Stage 2 – Desk research and analysis

- Depending on the results of the first stage planning process and business case analysis, the second stage would be for the operator to ask the infrastructure provider to undertake desk research on the route(s) identified by the operator.
- Taking Openreach's network as an example, this would mean providing data drawn from the duct records for comparison with the data available on the maps and the cable records to provide information regarding the underground and overground infrastructure along the route(s), and an indication of the likelihood that there would be available space on that route.
- Information regarding any planned works along the route, or in the nearby area, would also be useful to an operator. These would include any planned alterations to the network.
- Such information would be provided with appropriate disclaimers concerning accuracy and completeness, but would provide a greater degree of certainty, based on the infrastructure provider's knowledge of the network and general planning rules in use.
- This stage could be optional for those operators who wish to proceed directly to stage 3; this may involve a combination of stages 2 and 3 being provisioned together. However, it is important that this is offered as a separate stage, in order to provide operators an opportunity to consider whether to proceed following receiving this information.

Stage 3 – Survey

- The third stage would be for the operator to ask the infrastructure provider to conduct a physical survey of the required routes.
- The survey product would need to provide a standard means of requesting information along any part of a route or routes (between A and G as described below in the network diagram), as well as a standard way of recording the results, capturing the information required by operators.
- The survey would need to capture where there appears to be usable space, where chambers and other relevant network points are located (and what types), the type of duct or pole, and where space and/or access is not available, or where further stabilization work is required before further cables can be attached to an overhead pole.
- The survey should ideally be scalable depending on the requirements of the operator. Therefore, route distance might be the most appropriate unit to define the survey's requirements, and the survey product should permit surveying of the smallest distance that an operator would find useful.
- Operators may also require a survey to consider infrastructure operated by a third party along the selected route(s). Thought needs to be given as to how surveys along a route where multiple infrastructure providers are present could be most efficiently undertaken.
- A further consideration could be the interest of multiple operators in surveying the same or neighbouring areas. The process set up to provide the survey product may need to consider how best to efficiently survey an area in these cases, perhaps by providing opportunities for cost sharing.
- If a survey takes place, a record should be made that a survey had been carried out, by whom and when; this information should be indicated to operators conducting initial information gathering, perhaps through recording this on the network maps.
- Where a blocked route is subsequently cleared or the stabilisation of a particular pole strengthened by the infrastructure provider, this should be notified to those operators that had previously shown an interest in that route, but following the survey results had decided not to proceed with a deployment.

- Survey information is likely to be a valuable resource, and a means by which survey results can be shared between operators would need to be established. This would support both a cost-effective approach, and limit the disruption caused by multiple surveys. There are a number of options available:

    - All survey results immediately form part of a national database that all operators have access to. While this would lead to a more open approach, the free-rider issue may act as a disincentive to surveys being undertaken.
    - A process for cost-sharing between operators once the survey has been undertaken could be developed, by enabling operators to identify other operators that have conducted surveys in a particular area.
    - A period of exclusivity could be granted to the operator undertaking the survey, during which time they would be able to decide whether to proceed on the basis of these results. Once a decision has been made, the survey results are then released to other operators. This would not preclude commercial cost-sharing arrangements between operators during this period of exclusivity.

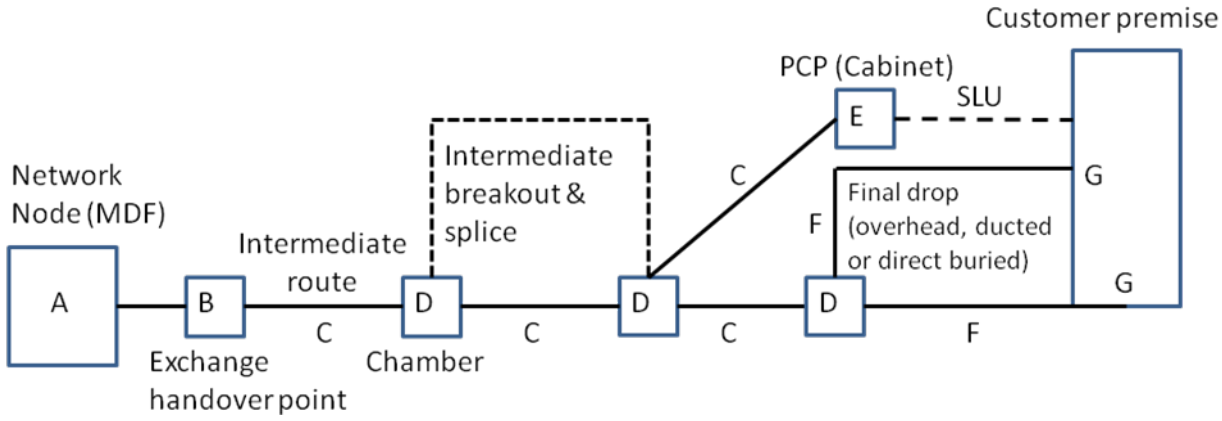
- Within the results of the survey the infrastructure provider should provide alternative deployment options and approximate costs for these, where the survey has indicated that a route, or part of a route, is not able to be shared.

Stage 4: Ordering and fulfilment

Once the pre-deployment stages are completed, an operator will make a decision whether to proceed with an infrastructure-sharing arrangement. Should they choose to proceed, there will need to be appropriate processes devised to permit the ordering of the required products, and the tracking of progress and issue identification and resolution. Many of these requirements will be based on existing industry practices and processes.

- However, passive infrastructure sharing contains an inherent uncertainty regarding the likelihood of a product being able to be provisioned, even following the pre-deployment stages. Therefore, processes to address issues arising from blocked ducts or pole instability and unavailable routes that weren't identified would need to be considered.
- One possibility is that the probability of a blocked route or pole instability is factored in to the pricing of a product-set, and that the infrastructure provider will resolve these issues in the most appropriate way as part of its agreement with the operator.
- Alternatively, the infrastructure provider could provide options and costs to the operator, with the operator having the option to cancel its deployment should an issue with the proposed route(s) arise and no suitable alternative can be agreed.

The products that would comprise the passive infrastructure sharing product-set are set out below. The requirements refer to the points marked A through G on the network diagram below. In practice, this involves a number of products that could be required and used in a variety of combinations, depending on the route and the operator's requirements.



A – Network Node (MDF)

- As with LLU, operator requirements would involve space, power and Cablelink services (similar to Access Locate).
- It may be that existing products to support LLU and interconnection are appropriate for this purpose.

B – Exchange Handover point

- Again, requirements are similar to LLU/interconnect: there needs to be space for multiple operators, in order to enable cable access to the exchange (In-Span Interconnect-type services).
- It may be that existing products to support LLU and interconnection are appropriate for this purpose.

C – Intermediate routes

- For duct access:
  - Space is the key variable, with the standard minimum requirement 25mm of space for a sub-duct.
  - Exactly how the sub-duct is provisioned needs to be resolved – working assumption is that Openreach would provision the basic sub-duct.
  - Equally, how the space within a sub-duct is allocated and utilised needs further consideration.

- Concerns over a 'land grab' could lead to efficient use requirements.
- Alternatively, open access requirements on any operator using a duct access product to deploy fibre may be required, ie they would be obliged in turn to provide access to their infrastructure based on the "passive access inputs" to other CPs. Typically this would involve provision of blown fibre tubes or dark fibre to third party CPs.
- Initial provision of blown fibre tubes and/or fibre for open access by the original infrastructure provider or the appointed contractor during sub-duct deployment should be considered as an option.

- For pole attachment:

  - This applies to sections of a route where an overhead infrastructure is available.
  - The requirements for sharing overhead routes could involve wayleave issues, as well as sharing space on existing and new telegraph poles.
  - A revision to the Communications Code to allow new overhead distribution is currently being considered by government; revising this and the associated planning regulations would need to be factored in to the to the consideration of overhead sharing.

- Where an overhead infrastructure is available, pole attachment products can be used:

  - To carry cables from pole to pole as part of a distribution network.
  - To carry cables from a pole to premise as the final drop.
  - To mount passive splitters that are used, for example, in the distribution network of a passive optical network.
  - To carry a cable from a nearby chamber (see D below) to the top of a pole.

- The condition of the asset at the time of the deployment may require additional work to be undertaken to strengthen or repair it. The arrangements for covering the cost of these works could be met in a similar way to that discussed above for addressing an unusable route.
- Further work on the economics of the available options would need to be undertaken in order to inform decisions on these issues.

D – Intermediate chambers or overhead cable runs

- Operators would require flexible physical interconnection; this translates to access to multiple intermediate chambers or overhead cable runs along a route in order to break in and out to connect to their own network.
- This would include access for splicing and maintenance in the case of a duct route; whether this would require a dedicated chamber or whether this could be achieved through access to a BT chamber needs to be addressed. It should be noted that SLU already has a chamber ‘break-in’ product that may form a satisfactory basis for all or part of this requirement. In the case of overhead deployment, the question of who physically undertakes the work would need to be addressed.
- This would be applicable to all chambers where duct access is capable of being provided or where access to a distribution network based on pole attachment has been requested.

E – SLU

- This will be covered by SLU-enabling products, such as PCPLink, but it is likely that additional options will be required and it is unlikely that all the current products are fit for purpose.

F – Final drop

- Up to the lead-in to the premise, this would be served either by duct or pole attachment as per ‘C’.
- From the lead in to the home, the minimum requirement is likely to be smaller than a standard sub-duct as described in ‘C’, as the minimum an operator would be required to provide to the home is a single fibre.

- Where fibres are available to the customer premise that operators are able to access, it needs to be clear that this is permissible under existing wayleaves.
- However, there may also be instances where new wayleaves are required to deploy new duct and cable to the customer premise. Where the final drop cannot be shared and new infrastructure is required, this would be dealt with as per the new infrastructure requirements paper.

G – Customer access

- Access to the home causes disruption to the end user; it may be necessary to consider a requirement for there to only be one operator to enter the home. This may place open access obligations on that operator to provide access to other operators as discussed above in 'C'. This could be similar to the 'mutualisation' policy in France.

Cost sharing

- Where multiple operators have expressed an interest in an area and wish to deploy in the same location, thought needs to be given as to how access is provided, particularly in the event of limited available space (i.e. insufficient space for the number of interested operators). This scenario could be particularly relevant where operators have shared costs in previous stages, such as the survey.
- One possible solution is for operators to determine between them who should have priority, as part of their cost-sharing arrangements.
- Alternatively, operators may wish to cost-share on the provision of new infrastructure.
- It may be necessary to consider whether, once an operator has decided to proceed with a deployment, a period of time should be permitted for other operators to declare an interest in that area and enable them to be part of the deployment. This would raise similar issues to the above, such as priority of access and the arrangements for cost-sharing in the event of new infrastructure being required.

<u>Stage 5: Lifecycle maintenance</u>

- Processes for the ongoing maintenance and repair of the infrastructure, such as fault diagnosis and reporting, during the lifecycle of the infrastructure sharing arrangement would need to be developed. Again, these could be based on existing industry practices.
- Provisions in the event of exchange closures and other network alterations would need to be in place. These currently exist for existing product sets such as LLU and Ethernet; it is likely that these provisions would be similar to these existing products.

<u>Stage 6: Cessation and redeployment</u>

- Provisions for asset recovery and/or reuse would need to be established. A range of issues would need to be addressed to develop this, including responsibility for the condition of the infrastructure asset, and processes for transferring the fibre asset should this be a desire on the part of the operator.
- This would need to include provisions in the event of operator insolvency, building on the existing Funds For Liabilities provision. This may need to be revised in order to ensure that it is fit for purpose, both for passive infrastructure sharing specifically and for the emerging NGA market more generally.
- Conditions exist on current Openreach products that could provide a template for the required conditions in this case.