Vodafone

December 2017

Response to Ofcom:

Dark Fibre Consultation

NON CONFIDENTIAL VERSION

Executive Summary

The UK's £2Bn+ market for business connectivity relies upon the availability of high quality fibre networks to underpin the communication needs of commerce and the public sector. It is a market where BT has significant market power across a wide range of services in most parts of the United Kingdom. Without the correct remedies in place, BT's market power is likely to act against the interest of consumers, risking higher prices, poor quality of service and a lack of innovation.

The homogenised active services available today are too often inefficient, less resilient, and have unnecessary layers of CPE and terminal equipment and more rigid parameters that reduce their usefulness and suitability. They have failed to deliver innovative services quickly to the market and have permitted BT to consistently make significant excess returns, totalling £850M in the BCM, since 2015/16.

Dark Fibre is the only realistic way to bring innovation and choice to as wide a section of the market as possible, and is an essential step towards accelerating competition and helping to meet the bandwidth and product demands of an ever more sophisticated customer base.

Ofcom's consultation to introduce this remedy from April 2018 is both a welcome, justified and proportionate step that is necessary to meet the evolving needs of consumers in the decade ahead. With so much work across industry already undertaken, the time for launch is now. The product scope, processes, contract and technical parameters are largely ready to go, Ofcom's reaffirmation of its commitment to Dark Fibre as a remedy, is both welcome and justified, recognising the important role the product can play in delivering for the end customers to ensure the market is well-positioned to meet the growing connectivity challenges that lie ahead.

The scope of the product needs to evolve, and quickly, so that customers make efficient choices and users can transition to new variants and higher bandwidths with ease, over as wide a geographic footprint as possible. To maximise the benefits of the remedy and optimise its value in the long term, it is crucial that Dark Fibre is offered to the market without usage restrictions. We would look to BCMR 2019 to complete the process, ensuring all areas and bandwidths that should benefit are included.

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1. Introduction

Meeting the challenge of delivering nationwide business connectivity in the UK

The £2BN+ Business Connectivity Market (BCM) forms the UK's digital infrastructure network. It provides services to commerce and Government: from connecting mobile base stations, point of sale and inventory management systems in the retail sector, to ATMs and commercial financial transactions, through to the transfer of vital patient information that allows the NHS to function day and night. In any given day it seamlessly enables billions of data packets to be exchanged and content to be transferred at scale, all of which are vital to the smooth operation of the private and public sectors and the wider economy.

As a nation we are becoming more dependent on this connectivity as each year passes. The UK's bandwidth needs are growing, with individual citizens adapting to a world where we have the mobile internet at our fingertips and have more devices connected at home, work and on the move. This shift in personal usage has given rise to significant additional demand for bandwidth at scale from organisations which are served by the Business Connectivity Market.

The market has struggled to cope with this rising demand, unable to move away from a legacy supply model reliant on BT's portfolio of active products, which are largely unchanged from a decade earlier. As a result, the retail market is largely a reflection of what has been offered by one supplier - Openreach.

The level of excess profits earned in recent years by BT in the BCM is nothing short of staggering (£327M above their WACC in FY2015/16 alone[1]), with this excess earned in the absence of material efficiency savings or service improvements (as Openreach simultaneously presided over the longest service crisis in its history). While the charge control currently in place has sought in part to address that level of over recovery, BT continues to make substantial excess returns. Those excess returns are evident in the rest of the UK and within Central London and the London Peripheral (LP) at all bandwidths. BT is naturally keen to maintain that level of excess by maintaining the sale of active services, to the detriment of its CP competitors and consumers.

The Openreach Statement of Requirements (SoR) processes have done little to encourage innovation and customers are often stuck on legacy products due to the cost and complexities associated with migration.

Openreach's active product suite is characterised by:

- A cumbersome and deeply flawed SoR process that deters innovation.

[1] Source Frontier Economics, based on BT RFS data.

- An Openreach / BT portfolio based pricing structure that is only concerned with regulatory charge controls and not customer requirements, resulting in considerable returns for BT Openreach;
- A prolonged and troubling quality of service crisis on Ethernet provisioning that has necessitated the introduction of regulated minimum standards.

With such widespread market failure and obvious market power, it is perhaps unsurprising that, absent regulation, there would be no incentives for BT to deliver for the market or end users. Under these circumstances it is clear that the active market is one that requires ongoing regulation in order to protect consumers in the medium term. However, while the market remains under constant strain as it struggles to meet rising demand and more sophisticated usage requirements efficiently, it is clear a longer term and more innovative remedy is urgently needed as Ofcom concluded in the Digital Communications Review.

Ofcom's rapid and necessary response this November to ensure the market was not left without basic active remedies underlines the important role that regulation has played in the day to day working of this market. Ofcom are to be commended for their swift response to the revocation of the existing remedies. Without such prompt and considered action, even more UK consumers and businesses would be facing considerable uncertainty and the prospect of significant price rises.

Dark fibre has a key role to play in the future. It has the potential to transform the UK business connectivity market from the rigid supplier-orientated market of today, where consumers of connectivity have terms dictated to them directly or indirectly by an SMP provider, to one that is far more customer centric, adapting to the needs of individual businesses and their locations. This should mean the introduction of a new range of services that are far more adaptable and put control in the hands of the customers, avoiding many of the problems associated with today's market, such as migration and platform closure.

Ofcom proposes that Dark Fibre will be priced on an *active* (product) *minus* basis (ensuring BT's cost are fully recovered). This will create another competitive dynamic that will benefit consumers when purchasing services in a market where BT has significant market power – a market from which excess profits have historically been earned with ease.

The market and consumers cannot wait until the outcome of the next market review in 2019 for dark fibre to start to bring its positive effects. Action is needed now to ensure the significant work accomplished on bringing Dark Fibre Access to the UK market in 2016/17 by industry was not in vain and that the UK's organisations who need access to more bandwidth can secure it at appropriate prices, from suppliers able to respond to their specific needs.

We are not surprised by BT's reluctance to accept the transition from active to passive remedies. Ofcom and industry are no stranger to this reluctance, first witnessed when BT first opposed the introduction of Partial Private Circuits (PPCs) in 2000/1, and instead set out a vision of the future where enterprises could only have BT Retail leased lines. Another example is when wholesale Ethernet services were introduced against their wishes in 2004/5. The same arguments played out over the introduction of Local Loop Unbundling in the consumer market.

Today, the market is unimaginable without these wholesale services and we are sure that in three years we will feel the same way about dark fibre, as it forms a key role in the supply and innovation of the UK's business connectivity needs. Unless this transition starts now, UK industry and consumers will be worse off and we firmly believe that the legal, economic and national interest case for introducing dark fibre has been more than satisfied. Inaction at this point risks harming the long term interests of the UK economy and its consumers and businesses.

Vodafone is clear, the UK must start the evolution towards passive connectivity without delay. This is the only way to promote competition and innovation as widely as possible, something that would be completely unattainable with today's centrally controlled, homogenised active services. Ofcom's consultation to introduce this remedy from April 2018 is both a welcome and entirely justified and proportionate step that is necessary to meet the evolving needs of consumers in the decade ahead.

In the following sections we provide evidence to support Ofcom's temporary SMP determinations using the BCMR 2016 market evidence and discuss the very clear and urgent need for dark fibre in the United Kingdom:

- Legal context for a UK Dark Fibre Remedy;
- Market assessment;
- The parameters of the Dark fibre remedy;
- Responses to questions.

2. The context for this consultation

Ofcom is consulting on the introduction of a Dark Fibre remedy in response to the SMP designations made on 23rd November 2017 for business connectivity markets. As a consequence of the outcome of the appeals Ofcom withdrew its 2016 BCMR SMP Regulations. At risk of a regulatory lacuna, which would have created significant uncertainty for the whole market, Ofcom decided to use its powers set out in Communications Act 2003 (s80A) in order to put in place temporary regulations to urgently safeguard the interests of consumers.

Whilst the imposition of remedies as a result of a finding of SMP at Very High Bandwidth had been subject to appeal, Ofcom chose to be very cautious, setting out temporary regulation that excludes remedies at Very High Bandwidth (above 1Gbit/s) as well as certain geographical areas. We will comment on the extremely cautious interpretation of the market findings that has led to the temporary exclusion of higher bandwidth services and three geographic areas in Section 3 of this response, however we are clear that Ofcom needed to act with urgency to protect the consumer interest and we fully support the decision taken to put in place temporary regulation with immediate effect.

Vodafone therefore fully supports Ofcom's use of its Communications Act 2003 (s80A) powers to make temporary market identifications, market power determinations and impose temporary SMP conditions and directions without consultation given the urgency of the circumstances. Ofcom has the power to take these temporary measures where:

- There are exceptional circumstances; and
- There is an urgent need to act in order to safeguard competition and to protect the interests of consumers.

It is our clear view that both these conditions have been met, with Ofcom taking necessary and proportionate action to address the Tribunal's findings, which overturned some of the specifics within Ofcom's reasoning and analysis from the BCMR 2016. In taking action to address the revocation of existing remedies necessitated by the Tribunal's decision, Ofcom has acted proportionately, relying on those parts of its reasoning and analysis that were not overturned by the Tribunal. Ofcom also takes into account new evidence that has arisen since the completion of the BCMR 2016.

The removal of all regulation from the BCMR clearly produced a significant regulatory lacuna that would be of great concern to Vodafone, other telecommunications providers and ultimately their customers. It is obvious

that when facing the prospect of unconstrained Significant Market Power, Ofcom needed to act urgently to safeguard competition and to protect the interest of consumers in this exceptional set of circumstances. Given the situation, it is very difficult to see what other approach would have been more appropriate.

We note that Ofcom had not received an offer of a voluntary arrangement from BT[2]. It is also difficult to see how BT's interests are at all harmed by the temporary SMP conditions imposed, since it remains subject to only those parts of the BCMR 2016 that BT had not challenged and the remedies which BT presumably was already complying with and where there was no dispute that BT has SMP. Ofcom also exercised an abundance of caution in employing these powers by not extending them to areas of its analysis that were criticised by the Tribunal, for instance beyond 1Gbit/s, or in certain Central Business Districts.

In assessing Ofcom's recent actions, it is important to remember that the regulation of Lower Bandwidth CISBO services considered in the BCMR 2016 was never challenged and as a result accepted as a necessary safeguard to competition and the wider protection of the consumer interest. Ofcom has acted proportionately, choosing to impose the remedies that were not subject to any complaint and that had been subject to full consultation and scrutiny in the 2016 BCMR. It is also worth remembering that Ofcom is only imposing these measures for a temporary period in order to bridge a very damaging regulatory lacuna that would leave SMP unconstrained. Work on conducting a comprehensive market review is about to begin shortly, with any new regulatory regime for the BCMR due to commence from April 2019.

[2] Footnote 13 Temporary Conditions Statement 23 November 2017

3. Market assessment

Ofcom's SMP findings are consistent with previous market analysis and the Competition Appeal Tribunal's judgment. Vodafone welcomes the importance Ofcom is placing on the need for a regulated Dark Fibre product to be introduced as a remedy. Dark Fibre has been subject to much consultation, product development and industry engagement around terms, conditions and operational processes since it was first mooted back in 2014. The product was due to go to industry trial in the summer of 2017, before it was withdrawn by Openreach following the decision by the Competition Appeal Tribunal. The immediate re-introduction of this vital remedy is to be welcomed. Although Ofcom has proposed some usage restrictions on the dark fibre product, we welcome the pragmatic approach taken to the revised market power assessment.

We note Ofcom's comments[3] that BT has market power in at least the rest of the UK, and in the Bristol and Manchester CDB in the supply of up to 1Gbit/s CISBO services. It is worth noting that the Tribunal has not found that BT does not have SMP in the three other CBDs or at bandwidths beyond 1Gbit/s, rather it queried Ofcom's conclusions for its findings of SMP in these geographies and at these bandwidths. At this point in time in the process there is clearly a balance to be struck between speed and completeness. Speed is required to avoid a damaging regulatory lacuna with the potential uncertainty, jeopardy and risk it brings to the market, contrasted against the accuracy necessary to establish a full suite of regulation at all appropriate bandwidths and geographies. Ofcom has taken a speedy, yet cautious approach to establishing regulation that provides a level of certainty for a large share of customers reliant upon the Business Connectivity Market. However, as a result of the cautious approach taken, there are geographies and bandwidths that (are for the moment) set outside the scope of the regulation currently proposed by Ofcom, which may in fact be more appropriate to include within it, had sufficient time been available to consider these matters. We hope this will be for a very limited time and that BCMR 2019 will provide the opportunity for all consumers who require it, to have access to services included within the envelope of regulation, thus remedying the adverse impact of BT's Significant Market Power where it exists.

Ofcom's revised market assessment takes account of the European Commission guidelines that list eight criteria as being particularly relevant to the assessment of SMP in the wholesale leased line markets, these include:

[3] Para 2.52, 2.74, 2.94, https://www.ofcom.org.uk/__data/assets/pdf_file/0019/108019/BCMR-Temporary-Conditions.pdf

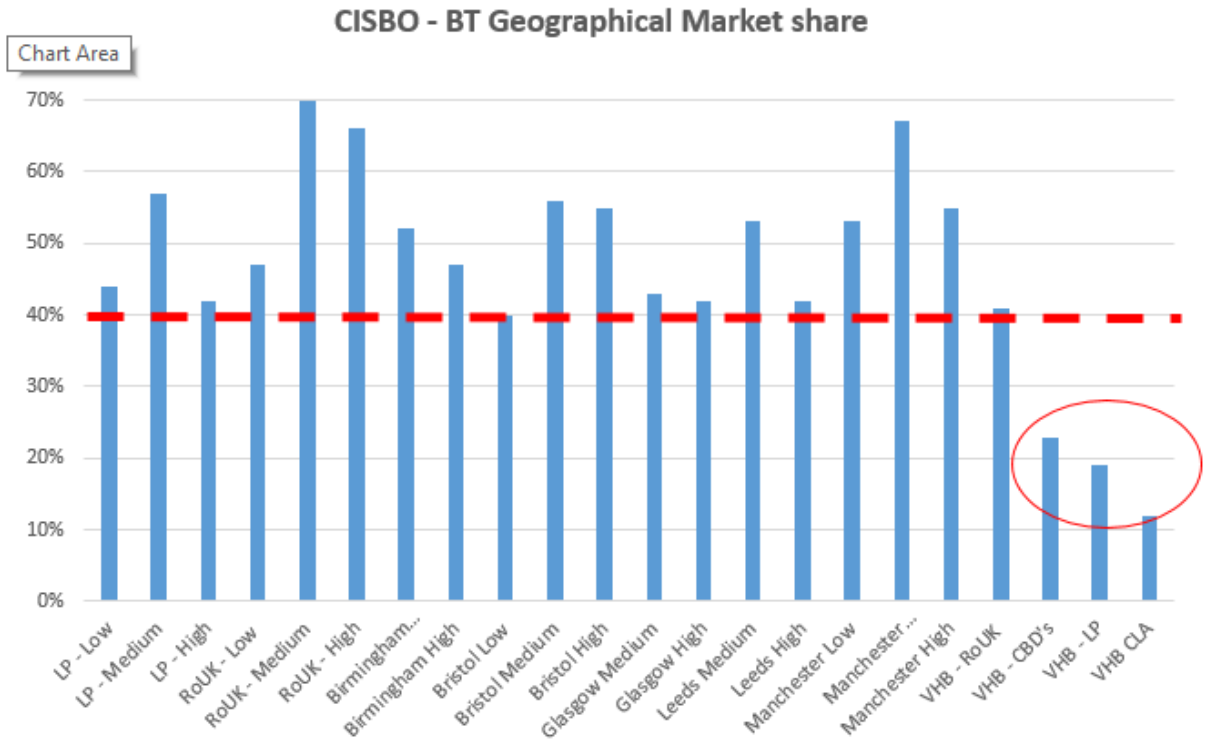
1. Market shares, market share trends and market concentration;
2. Control of infrastructure not being simply duplicated;
3. Economies of scale and scope;
4. Barriers to entry and expansion;
5. External constraints;
6. Countervailing buyer power;
7. Profitability;
8. Prospects for competition.

In this consultation and in the BCMR statement published last year[4], Ofcom carry out an assessment of whether each of these criterion indicate that BT has SMP. Ofcom concludes that all these assessment criteria indicate that BT does have SMP in the supply of CISBO service in most of the UK at the majority of bandwidths. Ofcom then focus on the market share criteria to further assess which geographic areas, and at what bandwidth capacity specifically have market power. As explained by the Commission in their SMP guidelines:[5]

> *"undertakings with market shares of no more than 25% are not likely to enjoy a single dominant position.....In the Commission's decision making practice, single dominance concerns normally arise in the case of undertakings of market shares of over 40%, however in some cases the Commission may have concern about dominance even at lower market shares"*
>
> *"according to established case law, very high market shares – in excess of 50% - are in themselves, save in exceptional circumstances evidence of the existence of a dominant position"*

Using the market share information published by Ofcom in this consultation[6], the chart below demonstrates the BT CISBO market share broken down by certain bandwidth and geographic units.

[4] BCMR 2016: https://www.ofcom.org.uk/__data/assets/pdf_file/0015/72303/bcmr-final-statement-volume-one.pdf
[5] Paragraph 75; http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52002XC0711(02)&from=EN
[6] https://www.ofcom.org.uk/__data/assets/pdf_file/0019/108019/BCMR-Temporary-Conditions.pdf Table 2.1, 2.3, 2.4 and 2.7



Source: Vodafone using Ofcom data

It is clear that Ofcom proposes to re-impose SMP regulation in a very conservative manner reflecting the limited amount of time available. With more resources and time at its disposal to conduct the detailed analysis necessary to go beyond what has been proposed here, we would expect Ofcom in BCMR 2019 to capture and recognise the number of supplier advantages at BT's disposal; with unrivalled network advantages of scope and scale as well a mass product marketing advantage, which results in other providers competing at a disadvantage.

Low bandwidth market has all but disappeared

BT's 2016/17 Regulatory Financial statements demonstrate that the 10Mbit/s (Low Bandwidth) market has all but disappeared. Newly supplied circuits in 2016/17 amounted to less than 1% of all newly supplied circuits: 284 in the RoUK and London Periphery, compared with over 33,000 100Mbit/s and 1Gbit/s circuits. Any further bottom up analysis would either proportionally weight these low volumes or ignore them from the analysis. Accordingly, this would then have a consequential impact on the inclusion of EFM products in the market analysis (which have their own particular supply characteristics).

The inclusion of copper based EFM products is no longer relevant

In the low speed CISBO category Ofcom have included Ethernet first mile products (EFM) in the market analysis. These capture services constructed from bonded voice copper pairs (typically MPF lines) purchased from Openreach. These services have a natural technical limit which means that they cannot be pushed much beyond 10Mbit/s. As a result, this alternative infrastructure base service will not be able to expand as customers' bandwidth requirements grow. Given the obvious limitations of EFM (and the different infrastructure supporting it), we would expect that any market analysis carried out today would choose to ignore such services, or appropriately ring fence them in the low bandwidth segment. The inclusion of these very low bandwidth services in this market has the effect of diluting BT's market share overall across all services (as illustrated in the chart above and reinforced in the analysis below):

If these services were excluded from the CISBO market (less than 1Gbit/s) then Vodafone believes that BT's market share in the CBD's of Birmingham, Glasgow, and Leeds would be clearly above 40% at all remaining bandwidth.

Birmingham CBD: Ofcom has chosen not to put in place remedies in this geography. BT has a market share greater than 50% in medium CISBO speeds (which, according to EC guidelines, would on its own indicate SMP), and market share is greater than 40% in high speed CISBO, and yet Ofcom has proposed not to put in place regulation in this geographic area. BT does have slightly lower than 40% (38%) market share in low speed and this factor alone has been used to justify the removal of regulation of BT's services in this area. However, recognising the current low volumes of 10Mbit/s newly provided services, it would appear that this has distorted the overall market analysis (particularly around new supply), resulting in the premature removal of regulation.

Glasgow CBD: A similar picture emerges for Glasgow, where BT has market share greater than 40% in both medium and high speed CISBO services, but the fact that one indicator (low speeds) out of the many indicators, shows BT to have slightly lower than 40% market share leads Ofcom to propose to remove regulation in the city.

Leeds CBD: Leeds has a similar profile to Birmingham, with BT having market share higher than 50% in medium CISBO services, and higher than 40% in high CISBO speeds. This factor alone has again been used to justify the deregulation of BT's services in the city. It is clear that Ofcom's conservative approach to market analysis will result in the removal of necessary regulation.

Geographic Scope of CBDs

Given the timescales available we have been unable to carry out a detailed analysis of the proposed CBDs, however it surprises us that such large scale geographic areas are subject to homogenous and equally distributed competition that warrants the removal of SMP remedies. We believe that the level of competition in these locations has been over-estimated. The reality is that within these areas there are likely to be locations where competition is sparse, with alternative CP connectivity limited or restricted by physical or economic barriers that result in a very constrained supplier choice. We would expect that Ofcom will continue to carry out market reviews in these geographies and that such anomalous outcomes will be investigated further within the scope of a full market review, such that an appropriate level of consumer and competition safeguard is put in place.

BT's market power is retained as customers buy new products

As customers require increasingly greater bandwidth, this has a reinforcing effect on BT's dominance. Copper based EFM products are no longer able to supply that demand, and thus fibre delivery is the only option. This plays to BT's strength: national scale and incumbent duct and infrastructure. We therefore believe that as bandwidths leading to 1Gbit/s and above become the norm, only BT will be able to supply at scale across the UK.

Historic incentives on BT to cluster infrastructure around BT locations

Over the past decade, Ofcom's regulation has, through historic charge controls and market reviews, incentivised CPs to undertake significant investment to enable them to purchase local access variants of Ethernet Services. The design of NGA services additionally requires the handover of services at local network handover points. This requires CPs to take co-location space at BT serving sites and then for the CPs to build or invest in backhaul infrastructure to aggregate circuits back to their own core networks. The investment undertaken has been substantial, with CPs opting to serve most of their customers from these locations.

This has culminated in CPs configuring their own infrastructure using a BT-centric approach, clustering capability around BT locations they otherwise may not have had. The investment has been worthwhile from a customer perspective, providing the benefits of competition and lowering prices. Although this investment is largely historic, it remains fairly recent and it represents the starting point for CPs in their connectivity with BT.

To bring greater levels of competition and innovation CPs must utilise Dark fibre, as the next stage of competitive development. FTTP roll-out, is even more challenging in the business context than in the consumer market, with customers spread out and lacking the density needed to make network build viable for enterprise solutions in all but the most concentrated of locations. This is why dark fibre, utilising BT's extensive access network is such a crucial remedy for the BCMR, where the prospect of scale FTTP investment for enterprise is not an economic reality. Ofcom need to ensure the right remedy for the right market, with FTTP incentivised in the mass market consumer space and DFA mandated to deliver competition and service innovation in the BCMR.

BT market power in very high bandwidth

BT has SMP today

Based on the existing market definitions it is clear that BT would be found to have SMP in very high bandwidth in the RoUK. Despite BT being a reluctant supplier of these bandwidths, coming to market late, choosing to offer expensive 10Gbit/s services via its OSA product and only recently opting to offer a more reasonable (yet still high margin) 10Gbit/s EAD product, BT has, with little effort managed to achieve a market share of 41% in 2015. The ability to secure so much market share by a reluctant supplier who prices uncompetitively and arrived late can only be put down to the expanding demand and corresponding lack of alternative supply options for these fibre services. We have no doubt that BT's share of the market will have grown higher since 2015, reinforcing their SMP in this market.

BT's SMP will increase with time

As very high bandwidth services transition from niche application to a standard requirement for a greater customer proportion, it is obvious that BT will further benefit from its nationwide duct network and greater fibre network reach. As such we will see a rapid conversion of BT's SMP in 100Mbit/s and 1Gbit/s supply toward higher bandwidth services. Based on BCMR data, medium (100Mbit/s) and high bandwidth (1Gbit/s) market share held by BT today equals 53%. This 53% market share would be even higher if the 10Mbit/s installed base were counted as 100Mbit/s services (there is no longer a viable market for new 10Mbit/s EAD connections, with 10Mbit/s services sold at 100Mbit/s prices). When considering the indications of market power (beyond simply the market share value) it is clear that the pervasiveness of BT's fibre infrastructure and SMP in adjacent bandwidth markets will gift BT a position of power in the supply of any symmetrical broadband fibre service:

1. Control of infrastructure not being simply duplicated;
2. Economies of scale and scope;
3. Barriers to entry and expansion;
4. External constraints;
5. Countervailing buyer power;
6. Profitability;
7. Prospects for competition.

BT's SMP is increasing while we delay

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4. Dark fibre is the right remedy

Openreach's customers formally used its Statement of Requirements process on 31st October 2014 to request a Dark Fibre product. This widely supported customer request was unfortunately rejected by Openreach. In 2016 Ofcom made clear it was convinced of the benefits that dark fibre could bring to the market and set out its conclusions that dark fibre would promote efficiency and better sustain effective competition in fibre base leased lines than would be possible with active remedies alone. We wholeheartedly agreed with this conclusion and it is evident that this was the common view point across industry and this remains the case today. After overwhelming support for the Dark Fibre SoR and Ofcom affirmation that dark fibre can deliver a level of competition, innovation and customer choice that would be impossible with active remedies, it is our

understanding that the highest number ever of potential trialists applied to participate in the Openreach DFA trial, clearly demonstrating the support and level of demand for the product across the industry. Each of the trialist indicated they anticipated demand for the product and backed this up with investment in order to prepare for participation in the trial.

It is evident that Openreach recognises that its active product set is deficient, being unable to meet the needs of its customer base and the marketplace, and that the cancellation of DFA for both 1Gbit/s and above 1Gbit/s has left a hole to be filled in the wholesale market. Openreach has recently consulted on the OSA Filter Connect (OSA FC) product following its withdrawal of the Dark Fibre Access Product earlier this year. Openreach has however continued to ignore the product features that set dark fibre apart from active services, with the OSA FC service still considered restrictive and inefficient by the CP community it is designed to serve. Specifically, OSA FC increases space and power demand, fails to reduce the number of equipment change-outs a customer must have to increase bandwidth by not addressing 1Gbit/s demand (which is the highest growing bandwidth today), and limits the growth of capacity by forcing CPs to use Openreach Filters for each service wavelength. This restriction in capacity can act to constrain the usefulness of CP provided capacity on the same backhaul serving arc, with the entire link reduced to the speed/capability of its weakest section.

We wholeheartedly welcome Ofcom's decision to stand by its analysis of the need for dark fibre conducted in the BCMR 2016, further buttressing this requirement with new evidence available that supports the need for dark fibre in the UK. The case for dark fibre has positively increased since the close of BCMR 2016. At that stage plans were less developed, with only rough estimates of costs and demand available. During the development of the product, internal plans within CPs were advanced in preparation for the launch of dark fibre and the appeal itself also focused minds around the cost and expected usage of the product.

As 2017 has progressed there has been a further strengthening of evidence from both a demand and product perspective that supports the introduction of Dark Fibre Access. We are in agreement that the benefits of dark fibre that we identify today will be a subset of the eventual benefits realised, yet those that can be identified today already highlight the deficiencies that exist in the active services available today and greatly assist in addressing some of the key challenges resulting from BT's SMP in the BCMR.

In the following section we set out a range of cost, operational and customer benefits. In addition, we capture some obvious innovation expectations, but we are confident these will be expanded further when the product is made available, with competing CPs being able to innovate in order to differentiate.

Ofcom correctly assesses immediate demand for DFA coming from enterprise customers for connecting their sites, MNOs for connecting their base stations and for broadband suppliers backhauling customer bandwidth. The following benefits are easily identifiable:

Equipment usage/innovation

- Immediate efficiency gains come from eradicating unnecessary kit duplication as found today where CPs replicate the Openreach kit to obtain control of the service at the site (which Ofcom describes as 'book ending').
- The active service that Openreach offers restricts functionality within the service equipment to the functionality which Openreach wishes to support. Consequently, this limits CPs to Openreach's choice of accessible features. The equipment is therefore not fully or efficiently deployed. Service differentiation based on feature set is prevented.
- Equipment used to provide the service is limited to the choices made by Openreach and the supplier arrangements that Openreach has in place. Service development, innovation, speed to market, differentiation can all be assisted by placing equipment control with the CP.
- Power saving and more energy efficient communication services are obtained when bookending is ceased and less kit is required to be powered.
- Better use of space and related cost savings at customer/cell /co-location sites as the bookending equipment space requirement is eliminated.
- In the same way that BT achieves operational efficiency and cost savings by installing 1Gbit/s optics when providing a 100Mbit/s service to facilitate a ready upgrade of the service, we wish to have similar flexibility and operational parity for intelligent equipment deployment for the services we offer.

Fibre cost savings/innovation

- DFA will lead to a more efficient use of fibre as CPs are incentivised by the per fibre costs to move to single fibre working. Openreach has deployed single fibre work for EAD services but not OSA. CPs will wish to invest in single fibre working to obtain the best cost base for all bandwidth even where Openreach to date has lacked that incentive.

Customer experience/innovation

- A DFA product could facilitate more flexible supply to customers. CPs will be better positioned to manage bandwidth requirements, technology change and avoid cease and re-provide processes and costs.
- Where it is a CP network that fully controls the equipment and feature that can be offered to the customer the full on-net customer experience and service control are then possible. This will include tighter synchronisation capabilities of the services offered, as is often required by Mobile Networks and financial services customers.
- DFA will allow CPs to put in place superior service in life monitoring (via Optical Time Domain Reflectometry – OTDR overlay) of the fibre which will allow faster fault detection and improve service availability for end customers.
- Network future proofing, reduced time and cost to increase capacity and capability or services and service monitoring.

Demand for Dark Fibre Access

Vodafone set out forecast demand for dark fibre access to Openreach in May 2017. This assumed:

- The product would be launched in October 2017 following the trial; and
- SLA/SLG would not be in place until April 2018.

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No further forecasts were provided to BT as the product was withdrawn ahead of the next demand forecast being provided. However, it is clear that if the product was to be made available in April 2018, as Ofcom proposes, similar circumstances prevail. We would slowly ramp up demand and not start to get to any kind of scale until SLAs and SLGs were in place and we have thoroughly tested Openreach and our own internal processes.

As a result, during 2018, Vodafone demand for dark fibre may appear to be limited, but this is not the case simply the nature of the on boarding process. This would be the case, whenever the product was launched (as a staged introduction is typically the best ways to ensure that the product and support processes are

robust). It should not be taken as any kind of indication of longer term demand, which we believe will be considerable with DFA becoming the default choice in many supply situations.

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The reality is that the introduction of a DFA product is likely to result in it becoming the default method of connecting new 1Gbit/s circuits when a robust product with operational SLAs comes on stream.

Dark Fibre pricing

Given that these proposals preclude the use of Dark Fibre for circuit delivery above 1Gbit/s, Ofcom's proposed pricing methodology, which assumed that Dark Fibre could be used for circuits above 1Git/s should reflect this. If a cost based approach or an active minus pricing methodology is to be used, 100Mbit/s would be a more appropriate benchmark given this sits fairly and squarely within the proposed market assessment. It is worth noting that Openreach, when installing a 100Mbit/s EAD, now fits 1Gbit/s optical equipment facilitating the anticipated upgrade to 1Gbit/s EAD in the future. From another perspective, Openreach have taken the efficiency gains by over-provisioning: something that customers' of Openreach have requested to be able to do through the DFA product.

Operational Delivery of Dark Fibre Access

Ofcom correctly identifies that Openreach has developed the DFA product, processes and systems to support the new product and it was only weeks away from meeting its regulatory obligation to launch the product. The costs incurred by Openreach for the full development have been funded from the active Ethernet charge control, setting higher services charges to recover these costs.

With respect to Vodafone, significant time and resources have already been incurred in order to plan our adoption of the product and to ensure that the product that Openreach develops meets our requirements.

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Growth in 4G data usage and the rapid rise of our consumer broadband propositions is fuelling this urgent need for greater bandwidth. In the short run, the absence of a DFA product without restrictions limits the UK's digital infrastructure capacity and could result in sub-optimal supply options being used.

Demand for Dark Fibre bandwidths above 1Gbit/s

Although Dark fibre at bandwidths up to 1Gbit/s will be useful in many circumstances, as highlighted above, there are already a growing number of situations where bandwidth demand requirements already exceed this bandwidth and the obvious solution would be to use a scalable dark fibre connection set at a bandwidth above 1Gbit/s. In addition, there are also a significant number of locations where 1Gbit/s would be sufficient to meet demand initially, but based on projected use of capacity an upgrade beyond 1Gbit/s is highly likely in the near term. A rational and efficient CP would install a scalable dark fibre solution[7] in these two types of situation, confident that an efficient technology choice was being made, through the ability to secure a dark fibre connection and then deploying scalable kit that could accommodate services set at 1Gbit/s and above, effectively future proofing the connection for some considerable time.

Restricted dark fibre is the only obstacle preventing this from occurring, resulting in sub-optimal choices being made both now and in the future. The restriction placed on the dark fibre and the uncertainty caused does come at a cost to both the CPs concerned and their end customers. A CP can either opt for an expensive active service (such as OSA/EAD 10Gbit/s) that lacks the upgrade flexibility and compromises the range of features available on the service, with multiple boxes required, or in the alternative order multiple 1Gbit/s dark fibre connections that allow service flexibility, but are inefficient to provision as even ordering two connections (at twice the price) would be well short of the bandwidth achieved over one connection set at 10Gbit/s over the same fibre - for only a very modest price increment.

This efficiency isn't theoretical; it is the stark commercial choice facing CPs at a growing number of sites which they have to serve. The choices made around circuit provisioning in the months ahead will dictate to a significant degree the commercial viability of the underlying services and in turn the level of competitive intensity in the overall market. To put it another way, the lack of an above 1Gbit/s option in Ofcom's latest proposals is expected to create adverse consumer outcomes in the near term, as the lack of certain around key options is expected to drive inefficient ordering. The scale of this inefficiency is only set to increase and it is vital that Ofcom offers clarity around dark fibre connections configured above 1Gbit/s as soon as is practically possible to do so, minimising the number of locations that will be served inefficiently, as their connectivity needs are assessed by CPs over the next twelve months. Granting DFA above 1Gbit/s is a game changer and introduces efficiency to capacity provisioning that will greatly benefit consumers. The only alternative option is for CPs to defer making connectivity decisions in the near term, risking network

[7] Just in the same way the BT act rationally installing 1Gbit/s optics for a 100Mbit/s EAD rental service.

congestion and impacting the quality of service offered to the market. Aside from the obvious customer frustration that will arise as a result of this, it is likely to impact CP reputations and in turn impact the competitive dynamics in the retail market.

We are clear, from a consumer welfare and network efficiency perspective it is vital that DFA services above 1Gbit/s are brought into service sooner rather than later, reducing the adverse impact on consumers and enhancing wider network competition.

Dark Fibre lighting the future

CP enthusiasm for dark fibre has not waned since its introduction was first mooted back in 2014. There was incredible customer and supplier disappointment expressed when BT decided to pull the product, given the commitment shown by industry towards its introduction. Today it remains a transformational service that will bring considerable benefits across the market, sparking innovation and a more customer centric approach to the supply of connectivity. Far from being dark, the new remedy is crucial in illuminating the UKs business connectivity needs from 2018 onwards.

Responses to questions

Question 2.1: Do you agree with our findings in relation to product market definition as set out in paragraphs 2.9 to 2.13 of the BCMR Temporary Conditions Statement, namely that we define a market comprising wholesale leased line services of all bandwidths at and below 1Gbit/s using contemporary interface (CI) technologies, including EFM? Please set out your reasons and supporting evidence for your response.

We discuss this in section 3 of this document

Question 2.2: Do you agree with our findings in relation to geographic mark.et definition as set out in paragraphs 2.14 to 2.19 of the BCMR Temporary Conditions Statement, namely that we define the following geographic markets: (a) the CLA; (b) the LP; (c) the CBDs of each of Birmingham, Bristol, Leeds, Glasgow and Manchester; and (d) the RoUK excluding the Five CBDs? Please set out your reasons and supporting evidence for your response.

In section 3, we set out our view that for the purposes of this consultation, Ofcom has taken an extremely cautious approach to market definition and findings of SMP.

Question 2.3: Do you agree with our assessment of the CI Core, as set out in paragraphs 2.101 to 2.111 of the BCMR Temporary Conditions Statement? Please set out your reasons and supporting evidence for your response.

We will comment fully on this during BCMR 2109.

Question 2.4: Do you agree with our findings that BT has SMP in the markets for Lower Bandwidth CISBO services in the LP, the CBDs of each of Bristol and Manchester and the RoUK excluding the Five CBDs, up to the end of March 2019, as set out in paragraphs 2.20 to 2.100 of the BCMR Temporary Conditions Statement? Please set out your reasons and supporting evidence for your response.

We set out in section 3 our view on Ofcom's findings of SMP. Whilst we agree with Ofcom's proposed SMP findings, it is clear that an abundance of caution has been applied by Ofcom. A more detailed assessment is likely to find that there is SMP across a wider geographic area.

Question 3.1: Do you agree with our proposed design of the dark fibre access remedy? Please set out your reasons and supporting evidence for your response.

We consider that the DFA product should be without usage restrictions in the longer term and certainly have a clear capability to be upgraded from 1Gbit/s use to higher bandwidths in the future. With such limited usage, a pricing approach that allowed the product to be used more readily as solution for 100Mbit/s circuits would be appropriate. Therefore, a 100Mbit/s pricing benchmark should be considered.

Although the contractual issues list is largely complete (150 issues resolved by July 2017) around 19 issues have still to be concluded. We understand that Openreach will now be restarting its dark fibre work stream and we expect that these outstanding issues could be resolved swiftly.

Question 3.2: If BT were to make available a dark fibre product based on the design set out above, how long would it take before your company was in a position to purchase it? From what date would you want BT to make such a product available?

We agree with Ofcom's proposals to require BT to provide the product from April 2018. Although our order volumes will be low until the SLAs and SLGs that support our ability to retail services based on DFA as an access component are in place in October 2018, the period between the soft launch (April) and the full launch (October) will benefit all parties to work to adopt the product and agree the SLAs and SLGs and one would expect orders to ramp up gradually.

Question 4.1: Do you agree with our assessment of the benefits of our proposed dark fibre remedy? Please set out your reasons and supporting evidence for your response.

Yes, as set out in section 4.

Question 4.2: Do you have evidence on the current relative prevalence of each scenario of active equipment configurations as shown in Figures 4.1 and Figure 4.2? Please set out your reasons and supporting evidence for your response.

Yes, when we purchase from Openreach, Vodafone will always add additional equipment to the end of the circuit in order to provision and manage the end service for internal or retail customer use.

Question 4.3: Do you agree with our view, as expressed in paragraph 4.27, that situations where cost savings to providers will be available from dark fibre are likely to be common? Please set out your reasons and supporting evidence for your response.

Yes, we expect all CPs would be able to realise a range of efficiencies by the move to passives.

1. The requirement for Network Terminating Equipment, used to provide and manage the end service to the customer, will be removed from Openreach's service – reducing the overall power, space and cost for each circuit.

2. It is our understanding a proportion of faults with the current active service are down to equipment failure rather than fibre failure. Reducing the layers of equipment within the end service (bookending) will therefore substantially improve service quality and reduce service failure costs.

3. We agree that the difference in costs between short range and long range SFP costs should be included for the proportion of DFA circuits that will not be Local Exchange variants.

4. We disagree that there are additional incremental running and maintenance costs in a dark fibre solution compared to managing an EAD as an input to a retail service. Vodafone adds its own NTE to the current Openreach active services in order to manage and maintain the service checking for faults. Using dark fibre this activity will continue in the exact same manner with the benefit of the removal of equipment faults within the Openreach active service. Ofcom is therefore incorrect to add £112.50 (NLA) or £113 (LA) as additional costs for the use of dark fibre in all use cases and in the case of Vodafone usage of DFA.

5. The cost savings of moving to dark fibre are:

   Scenario 1, dark fibre instead of EAD1Gbit/s £535 - £16 = £519 + less service faults due to removal additional Openreach active equipment.

   Scenario 2, dark fibre instead of EAD 1Gbit/s £510 - no reductions = £510 + less service faults due to removal of additional Openreach active equipment.

Question 4.4: Do you agree with our assessment of the risks and costs of our proposed dark fibre remedy? Please set out your reasons and supporting evidence for your response.

Yes.

Question 4.5: Do you agree that we should impose a dark fibre remedy for the period April 2018 to March 2019? Please set out your reasons and supporting evidence for your response.

Yes, although we consider there is a strong case for DFA to be available for more use cases even during the temporary SMP condition period.

Question 5.1: Do you agree with our forecast for dark fibre take-up in 2018/19? Please set out your reasons and supporting evidence for your response, including any volume forecasts you have for consumption of dark fibre for 2018/19.

The forecast should take account that the first 6-month period will have lower take up as a result of a lack of SLAs and SLGs.

CPs will have differing procedures to manage the integration of DFA into their product set. We have discussed how our approach to this would work at our bilateral meeting with Ofcom on 6th Dec 2017. We include our forecast as submitted to Openreach in May 2017 within Section 4. This forecast is indicative of demand at 1Gbit/s alone.

Question 5.2: Do you agree with our proposed charge control on the proposed dark fibre product? Please set out your reasons and supporting evidence for your response.

Ofcom propose in this consultation that 73% of new EAD links procured by operators will be dark fibre products and that the proposed dark fibre products will be available from April 2018. This results in an active Ethernet charge control of CPI-13.5% in period 2, however if the dark fibre remedy is not implemented active volumes will be greater and the increased returns delivered will result in a CPI-15.5% control on prices to bring active Ethernet revenues in-line with costs.

Whilst Vodafone agrees with this approach we consider there is a risk that BT could enjoy excess returns due to the practical difficulties and timescales of the dark fibre implementation. In the event that the dark fibre remedy is implemented in April 2018, period 2 of the active charge control is maintained at CPI-13.5%, and practical difficulties means that take-up from operators is lower than the 73% of new connections forecast BT would enjoy excessive returns in period 2 which could be significant. These excessive profits will not result from BT efficiencies or other positive developments in the leased line market, but due to over-estimates or under supply of Dark Fibre.