

# Wholesale Local Access Market Review

## Response to Ofcom consultation on possible approaches to fibre cost modelling

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# 1. Executive Summary

1. We welcome the opportunity to respond to this consultation as an early contribution to the upcoming *Wholesale Local Access Market Review* (“WLA Market Review”).
2. We appreciate Ofcom’s clear positioning that this consultation does not indicate any decision regarding future price regulation of Openreach’s fibre broadband services and that a cost model is being developed to understand the costs of services provided over fibre access networks ahead of Ofcom’s broad set of policy deliberations. This clarification is helpful.
3. However, a model of the type proposed, dependent as it is on assumptions about future demand and supply conditions, cannot be viewed in isolation from the strategic policy issues it is seeking to inform. In this response, as well as specifically commenting on the proposed modelling approach and model structure, we also consider the purpose for which any cost model will ultimately be used in the WLA market review and raise some fundamental points concerning Ofcom’s overall approach and objectives for future regulation of fibre access.

## **There are significant risks of regulatory failure in basing regulatory policy decisions on the outputs of long-term forecasting models in rapidly changing markets**

4. Ofcom will carry out the WLA Market Review against a backdrop of ongoing and long-term transformation in the demand for and supply of access services. Ofcom must ensure that its regulatory approach encourages the innovation and investment necessary to support ongoing transformation and in particular the growth in supply of ultrafast, alongside superfast, fibre access services to the benefit of UK citizens. Ofcom should take into account its own publicly stated goal of encouraging infrastructure investment by Openreach (beyond that already apparent from Virgin Media), and make sure that market prices for all forms of access are sufficient to encourage, not prevent, entry and expansion.
5. Uncertainties about the precise nature of future supply (costs and technology) and future demand, including the timing and pace of growth and willingness to pay, create significant commercial risks for investors. If regulatory uncertainty and premature regulation are layered on top of these uncertainties, incentives to invest and innovate will be undermined, in direct conflict with Ofcom’s regulatory duty to secure efficient investment and innovation,<sup>1</sup> and thereby resulting in regulatory failure. To avoid this regulatory failure, Ofcom should not default to using the standard techniques that have been applied to the provision of copper access, in assessing the profitability of fibre services. A distinction must be drawn between: (i) forecasting costs for copper access where investment, supply and demand have been relatively stable for a considerable time and are expected to remain so in the short term; and (ii) forecasting costs for fibre access which is highly dynamic in terms of supply (investment, coverage, innovation and technology) and demand (pricing and take-up).
6. Given the forecasting challenges, Ofcom must recognise from the outset that there is a real risk of regulatory failure if the outputs of the hypothetical modelling exercise it undertakes are used to shape regulatory policy.

## **The design of the proposed model has no clear links to the strategic policy decisions Ofcom faces**

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<sup>1</sup> See Communications Act 2003, section 4(7)(8)

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7. The general risks that can arise in undertaking cost forecasting exercises are exacerbated by the specific proposal to derive a set of in-year costs of supplying fibre access to date, and during the upcoming market review period, based on assumptions about the supply and demand of those services long into the future e.g. it is proposed that Economic Depreciation is used to derive costs in any single year, based on assumptions around long asset lives and forecasts of demand over a 40 year period.
8. In particular, Openreach is concerned that the assumptions used within this long-term model would be made with little, if any, consideration given to changes in headline speed requirements, the emergence of alternative technologies and/or changes in access competition over that extended time period. The proposed model appears to seek to identify the costs faced by a hypothetical efficient operator deploying VDSL2 technology to UK premises within the commercial footprint, based on the assumption that the underlying assets supporting that specific technology could be utilised to meet demand over the modelled period and that there is no significant entry by an alternative access provider in that period.
9. Ofcom's rationale in proposing to design the model in this way is not clear. Ofcom confirms that its strategic objective is to "*promote the interests of consumers by encouraging the large scale deployment of new fibre networks in support of providing competing ultrafast broadband services.*"<sup>2</sup> But the proposed model design appears to be at odds with Ofcom's own strategic vision of the future, where growing consumer demand for higher capacity in the access network will be met by competing investment in ultrafast technologies. The model would, by design, take a "technology constant" approach which, given the limitations of the VDSL2 technology, would also amount to a "demand constrained" approach.
10. In proposing its approach, Ofcom states that it expects "... FTTC to remain the predominant technology used by BT for delivering NGA services over the period of the [WLA] review"<sup>3</sup>, by implication equating "FTTC" with VDSL2 technology. Not only does this ignore the impact of Openreach's deployment of G.fast, the expanding capabilities of the Virgin Media network in terms of headline speed and geographic reach and the investments of City Fibre and others to supply NGA services within this market review period, the model design also fails to take into account assumptions around developments in competition *beyond* this market review period. Different assumptions about what will happen to volumes beyond 2020 would drive different views on in-year costs and profitability to date and during the next three years.
11. This serves to expose that the specific purpose of the modelling exercise in this consultation is unclear; this is compounded by contradictions within the consultation. Furthermore, the timing of this modelling consultation is curious. Ofcom has not yet defined or assessed competitive conditions in the relevant access markets for the market review period. Nor has Ofcom ascertained the specific set of issues it wants to consider in relation to the provision of access services during this market review period and beyond. This lack of clarity makes it very difficult to meaningfully respond to all aspects of the consultation. The appropriate structure (and inputs) of the model could be very different depending on what insight Ofcom was looking for the model to provide in considering policy options today. Moreover, the high sensitivity of any model outputs to the approach taken to the core design features and future assumptions serves to emphasise that a 'one size fits all' approach cannot provide a truly 'neutral' factual basis on which to consider the relevant issues.

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<sup>2</sup> Para 2.12

<sup>3</sup> Para 3.5

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### **Assessing Openreach prices and profitability by reference to the outputs of the proposed model would risk undermining Ofcom's stated objective to encourage investment in ultrafast services**

12. Any cost modelling exercise undertaken at this stage must be clearly rooted in the context of Ofcom's stated strategic objective to encourage investment in the provision of ultrafast services. Openreach is concerned that the proposed design would be deficient in a number of material aspects:

- Any model based on an approach that assumes all future demand can be met by existing technology is likely to generate results (e.g. around "efficient pricing" of the current technology), that conflict with the strategic objective of encouraging investment to deliver ultrafast services from a range of access providers in a range of technologies. The model would fail to provide any real insight into the recognised future investment challenges and the commercial basis on which any investment decisions would actually be taken.
- There is a significant risk that the modelling approach becomes self-fulfilling if it ultimately results in requiring Openreach to align its prices for its current superfast portfolio to the proposed modelled costs; prices will be at levels that require high utilisation of existing assets and this will discourage investment in alternative technologies thereby constraining demand for faster access speeds that would otherwise be expected to materialise.
- Using the proposed model to evaluate the 'fair bet' at the point Openreach made investments in the VDSL2 technology would be profoundly flawed because the model would use hindsight knowledge of actual demand to date and then project a wholly unrealistic view of future demand for services utilising those assets. Undermining the fair bet principle has implications for future investment decisions by all potential investors.
- Even under the proposed scorched node approach, Ofcom's proposed approach infers that a more efficient network design could have been deployed by Openreach at the time the investment decisions were made. Such a benchmark risks applying further hindsight bias to real time decisions made by Openreach around where, when and how to deploy a new technology in the face of highly uncertain future demand. This again introduces significant regulatory risk to investment decisions made today and in the future about the deployment of innovative technical solutions to deliver services.

#### **To mitigate risks of regulatory failure, Ofcom should adjust the parameters of the model design and be cautious in interpreting any model outputs**

13. Against this background, Ofcom must exercise caution in using the fibre cost model and applying its outputs; specifically Ofcom must ensure that any decisions taken in relation to the structure of the model do not pre-determine substantive decisions as part of the WLA Market Review which are yet to be consulted upon. Ofcom must also remain open to revisiting the fibre cost model in light of developments during the main WLA Market Review.

14. In addition, Ofcom must take steps to mitigate or reduce, the risks and concerns identified by, for example: (i) adjusting modelling parameters and future assumptions; (ii) giving full weight to these factors in considering modelling sensitivities; and (iii) interpreting the outputs of the model in reaching policy positions. At an absolute minimum, Openreach considers significant changes are required to ensure a more realistic view of the future cashflows from current superfast services is reflected in the model. In particular:

- The model does not capture all costs incurred to date by Openreach. For example, the model does not include any costs for network planning time, Spine provision, Traffic Management, duct blockages, Business rates, Service Management Centres, fuel, fleet, modems or additional cards to support capacity management. This response highlights a large number of significant modelling gaps in capturing costs driven by the provision of superfast services;

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- The focus of any model based solely on VDSL2 must be no longer than the 20 years considered when the decision to invest in the Openreach network was taken. The model should focus on payback in that period and, in particular, on the projected position at the end of this market review period;
- In order to capture this risk of technology shifts, asset lives assumptions, and ensuing in-year capital allowances, must be limited to 20 years at the most, i.e. must not assume economic usefulness of assets beyond the 20 year framework;
- To take account of the fair bet, weight must be given to expected levels of demand at the point investment decisions were made and to current risks that investments in higher speed technology (whether by Openreach or others in G.fast, FTTP or DOCSIS3) will reduce demand for VDSL2 technology in the 20 year period; and
- The position on the recovery of common costs shared between copper access and the overlay technology must be clearly established to avoid the risk that certain costs could fail to be recovered over time due to differing treatments in different models.

**Overall, Openreach's position is that future innovation and investment in NGA is best supported by regulation no more intrusive than of the current regulatory approach to pricing of NGA services**

15. For the avoidance of doubt, our position is that current and ongoing market conditions and constraints on Openreach's NGA pricing, within the EOI framework, do not justify any increased level of price regulation for fibre services. Openreach does not expect to have achieved payback on its initial VDSL2 investments before the end of this upcoming market review period and is nevertheless planning to make further investments to upgrade capabilities. Any intervention to constrain commercial pricing in this upcoming market review period would therefore be unnecessary and unwarranted. Intervention would also signal that any further investments are at risk of premature and heavy-handed regulatory intervention that would second-guess any ex ante risky decisions made by private investors.
16. In considering its policy options and assessing a potentially wide range of information based on observable historic data and uncertain future projections, Ofcom should adopt an approach that remains focused on its strategic objectives and is consistent with good regulatory practice. In particular, Ofcom should:
  - Take a life-cycle view of investments, not a static in-year view, both (i) recognising the cost impact occurs before revenues arise and (ii) take full account of risks and uncertainties faced when investment decisions are taken;
  - Be forward-looking, taking account at the outset of the incentives to invest in future and all ongoing risks and uncertainties;
  - Be committed to policy principles and strategic objectives, recognizing that regulators can make and stand by long term policy commitments to encourage investment, and recognizing that a regulator not holding to its policy commitments is a huge disincentive to future investment;
  - Not impose constraints on cashflows before investors have achieved pay-back to avoid investor harm being inflicted before consumer harm can have arisen;
  - Take account of the need to encourage investment by new entrant competition, recognising that regulating returns to the perceived WACC of the incumbent will prevent entry; and
  - Not impose additional price control measures unless clear consumer harm has been identified, recognising that retail competition constrains wholesale pricing.

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17. In light of the concerns expressed above, and the extended timeline for the WLA Market Review (which is not expected until October 2016 at the earliest), Openreach reserves the right to make further substantive submissions in relation to the modelling approach as Ofcom's overall approach becomes clearer.

## 2. Background

### Introduction

18. In this section, we briefly set out some background on the context for the upcoming WLA Market Review and the modelling exercise Ofcom is undertaking. As is clear from that background, it is imperative that this consultation is conducted, and any outputs are applied, in an appropriate manner.

### **A continuing and ever increasing demand for superfast services**

19. Since 2008, significant investments have been made in deploying capabilities across the UK to make superfast broadband services available to consumers. Over the last eight years, Openreach has installed VDSL2 technology in new street cabinets and laid fibre out from local exchanges such that 90% of UK households have the option of taking superfast services from via Openreach and other 3<sup>rd</sup> party suppliers. This figure will reach 95% by the end of next year.
20. By the end of March 2016, Openreach was supplying active wholesale superfast broadband connections to enable CPs to deliver superfast access services to almost 6 million homes i.e. circa 25% of homes passed and about 30% of all broadband lines supported were on the Openreach network.
21. Further growth in take-up will be driven by customer willingness to pay. Retail prices for standard broadband services, offering speeds up to 24Mbps, are among the lowest in Europe reflecting strong competition based on Openreach's supply of unbundled copper lines on equivalent terms and at regulated prices. There are limits to what premium customers will pay for faster services, driven by perceptions around the improvement in the experience they will see from any upgrade. To continue to drive take-up, Openreach pricing of wholesale superfast access will need to continue to reflect the commercial realities and drivers of consumer demand.
22. While there are uncertainties over the pace of change and customer willingness to pay, it is clear that the future will see continuing growth in demand for ever faster speeds.
23. Against this backdrop, Ofcom rightly wants to focus its strategy on promoting investment. Specifically, Ofcom has stated that its strategy is to *'encourage large scale deployment of new fibre networks in support of providing competing ultrafast broadband services'*<sup>4</sup>.
24. Openreach stands ready to play its part in delivering this next generation of ultrafast services as it continues its investment in NGA services. In parallel to the extensive VDSL2 rollout, BT has been investing in research and development in new technologies to find economic solutions to deliver even higher capacity connections to UK consumers. Following a series of trials of new G.fast technology, Openreach stands ready to begin investing to deliver ultrafast broadband services of speeds up to 500Mbps to 10 million homes by 2020 with an ambition to get this to 12 million homes shortly afterwards. Openreach has also announced plans to extend fibre to the premises, enabling potential to achieve 2 million premises passed by 2020.
25. Other providers are also investing to deliver ultrafast capabilities. Virgin Media has announced 'Project Lightning' where it has ambitions to reach a total of 17 million homes by 2020 delivering superfast or ultrafast services using DOCSIS3 technology and, for certain

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<sup>4</sup> Para 2.12

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premises, optical fibre to the home. Hyperoptic and City Fibre are among other companies also investing in fibre to the home.

26. Given the strategic objective set out at paragraph 2.12 of the consultation document, Ofcom wants to encourage investment in ultrafast services and is pursuing a number of policies, e.g. looking at the terms on which Openreach supplies duct and pole access to potential new investors, to meet this objective.

### Encouraging future investment

27. It is against this backdrop that Ofcom will conduct the WLA Market Review. Given the stated strategic objectives, we would expect that all analysis and, ultimately, all decisions relating to whether and how to regulate the provision of access services – whether passive or active, standard, superfast or ultrafast – to be made by clear reference to the impact on future investment. We expect the modelling exercise in this consultation to be part of this.
28. All potential investors in any NGA technology (on any scale and in any geographic location) need to weigh up the costs of deploying the chosen technology against future revenue opportunities. Future revenue opportunities will be driven by customer willingness to pay for the higher access speeds that the technology may deliver, taking account of the alternative technologies and/or suppliers available in the future. The risks faced in making investment decisions are significant: ongoing technological innovations and risk of wasted funds; uncertainty over the nature and scale of future demand; and potential changes in the structure of commercial players in value chains. These all present obvious difficulties in projecting future cashflows. The only certainty is ongoing change. The risk of investment being held-up as potential investors ‘wait and see’ can be high.
29. In the face of uncertainty about future changes, potential investors will prefer to take decisions about the timing, level and nature of investments where payback is as early as possible and where plausible upsides to modelled base case scenarios exist to offset identified risks of downside outcomes. Given the high upfront costs in deploying NGA technologies before revenues can be generated, and given constraints on pricing arising from competition and customer willingness to pay premiums for access speeds faster than those available from existing technology, payback on any investments is only likely to be achieved over a relatively long period. Investors will only commit funds where they expect that future cashflows from the investment will be positive and provide the opportunity to earn rewards sufficient to justify the risks taken, reflecting their own assessment of all supply and demand side risks and uncertainties.
30. The potential for regulators to constrain prices and future cashflows of NGA will be a significant risk for any potential investor in NGA. To date, Ofcom has taken an approach that has generally allowed freedom in how Openreach prices NGA services, subject to EOI requirements and the need to comply with the VULA margin remedy. As discussed above, this approach has allowed extensive investment in NGA to take place since 2008 as investors have been able to make judgements on risk/reward with confidence that regulation would not constrain prices beyond constraints faced as a result of market factors.
31. Ofcom will be considering a range of policy options in this WLA Market Review that will impact the decisions made by market players considering further investment in the future supply of ultrafast NGA services. It remains vital that Ofcom assesses the costs of supplying NGA services in the period of the review which continues to take full account of the commercial realities of making these investment decisions in a rapidly changing market. Ofcom has not yet proposed how it would define markets in this review, let alone whether it believes any market player holds SMP in relation to the provision of NGA services and, therefore, whether any remedies are justified. But Ofcom has clearly signaled that it wants

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to model the costs of supplying NGA services to assess whether the *'fair bet'*<sup>5</sup> on Openreach's initial investments in NGA has *"run its course"*,<sup>6</sup> with the implication that Ofcom may consider introducing regulatory constraints on Openreach's pricing of NGA services. The modelling approach that will inform that assessment is therefore crucial.

32. In general, Ofcom assesses Openreach's costs of supply by reference to in-year accounting costs using data published in the Regulatory Financial Statements (RFS) as the start point for assessments. The RFS data also generally forms the start point for establishing periodic CPI-X charge controls where the standard approach – e.g. in relation to setting regulatory controls on Openreach's copper access prices – is to forecast the costs of supply for the three-year period of the proposed control and requires that, by the end of the control, prices align with the forecast costs. Forecasts of demand, scope for operational efficiencies and levels of investment needed to maintain the assets and support ongoing supply during the three-year control period will drive forecast unit costs. By setting prices on this basis, regulators will believe that a *'fair bet'* is provided if the regulated firm meets the assumed level of operational efficiency and drives the assumed level of demand, then the prices it is allowed to charge will generate revenues sufficient to cover costs. The firm is provided with a fair opportunity to earn a reasonable return on ongoing investment in the products, but constrained from setting charges that are unreasonably high.
33. Any regulatory exercise to establish and forecast in-year costs – whether to assess current profitability and the need for controls or to establish such controls – presents challenges. A significant share of the costs of providing network services is made up of largely fixed investments in network assets that can support the provision of a number of services over a number of years. The treatment of such capital costs in the RFS is a crucial driver of in-year costs referenced in assessing prices for any given product – i.e. how capital costs are allocated across products and how they are depreciated over time. For established products utilising existing assets and where no significant demand or supply side shocks are anticipated, judgements about asset lives and annual depreciation charges can be made by reference to existing data. Furthermore, forecasts of the costs of supplying established and stable products can be made by direct reference to observable trends and relationships (e.g. between costs and volumes or between demand and economic parameters) and, as a result, forecasting risks can at least be manageable, even if the forecasting exercise and judgements can be still subject to disagreement between stakeholders. But for new products based on investments in new assets and where ongoing changes in supply and demand are anticipated, the uncertainties around asset lives, depreciation profiles, annual capital costs and future forecasting will be significant. Establishing a view of the 'in-year' costs of supplying services will be highly sensitive to risky assumptions about future demand for the services supplied by the assets invested in.
34. There is an obvious potential conflict here between the basis on which commercial ex ante investment decisions in new assets are made, i.e. with a view of expected payback over an assumed product life-cycle taking account of upside and downside risks to supply and demand, and the way in which regulation assesses the reasonableness of prices over the short term by seeking to identify and remove all 'excess returns' by reference to 'in year' costs.
35. There are significant risks in adopting a standard regulatory approach to derive and forecast annual costs in the face of uncertainty and then using this to assess the *'fair bet'* relating to Openreach's 2008 investment decisions and/or to consider the fair level of pricing to apply during this market review period. The risk of regulatory failure arising from such an approach

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<sup>5</sup> Para 2.12

<sup>6</sup> Para 2.12

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as prices were set which failed to reflect the forward-looking, risk-assessed costs of meeting future demand would be considerable. Prices set by such an approach would fail to encourage efficient investment. Moreover, given that Openreach (i) has not yet achieved payback on the original wave of NGA investment, (ii) does not expect to do so before the end of this market review period and (iii) is now seeking to commit to further investments in NGA, it would be counter-intuitive if any modelling approach concluded that the 'fair bet' had run its course and that regulatory intervention was justified to reduce Openreach's prices.

### A robust consultation is required

36. As is clear from the above background, the output of this consultation could have a significant impact on the regulation of the WLA market in the UK and accordingly it is imperative that this Consultation is conducted, and any outputs are applied, in an appropriate manner. In this regard, Openreach has a number of observations on Ofcom's decision to consult now on possible approaches to fibre cost modelling, the nature of the Consultation and the future use of the model being consulted upon (and its ultimate outputs).
37. Openreach has concerns about the timing of the Consultation. Ideally a consultation on fibre cost modelling should take place after Ofcom's review of the relevant markets, incorporating the relevant market definitions and competition assessments in those markets. It is premature to open this consultation at this stage of the WLA Market Review process, in particular given that the consultation relates to an entirely new model. Conducting the fibre cost modelling consultation at this stage in the WLA Market Review process requires Ofcom to be particularly flexible in how it applies the model and indeed reopening the consultation at a later stage if necessary.
38. In particular, Ofcom must take steps to ensure that it does not fetter its discretion to act (or not act) in the future and does not prejudge any of the matters which might arise as part of the subsequent substantive WLA Market Review. By way of example, a decision to limit the model to a certain product/technology cannot impact on a future decision as to the relevant market definition. This might require, depending on developments during the substantive market review and prior to any final WLA Market Review statement, Ofcom to revisit aspects of the fibre cost modelling and re-consult on those aspects with interested parties.
39. Openreach also has concerns about the nature of the consultation, in particularly the lack of clarity over certain elements of the consultation. Most importantly, the purpose of the consultation is not clear. For example, the fibre cost model could be used to assist with the consideration of Openreach's 'fair bet'. Alternatively, it could be used to assist with the consideration of any potential price control of fibre services. The appropriate structure (and inputs) of the model would be very different depending on which of these matters the model was to be used for. The failure to set out clearly the purpose is a fundamental flaw in the consultation and impacts the ability of respondents to meaningfully engage. Ofcom should clarify the purpose of the model. In addition, parts of the Consultation are not consistent. By way of example, in some parts of the consultation, Ofcom refers to the use of BT's actual costs, but only using the Commercial deployment in the past, (see paragraph 3.6), whereas in other parts, Ofcom appears to be suggesting that the costs of a hypothetical efficient operator would be appropriate (see paragraph 3.13). Inconsistencies such as these make it difficult for respondents to understand how the proposed model will actually work.
40. In light of the above concerns about the consultation, Openreach would urge Ofcom to remain open about the final form of the model and the way in which the outputs are used. Further, Openreach reserves the right to make submissions in the future to Ofcom on the

use of the model, including submissions that substantive changes must be made to the model.

## 3. The Proposed 2016 NGA Model Approach

### **Question 3.1: Do you agree with our proposed NGA modelling approach? Please provide reasoning for your answers.**

41. Openreach does not agree with Ofcom's proposed modelling approach.
42. Given the stated strategic objective of encouraging investment to deliver ultrafast services from a range of access providers in a range of technologies, Ofcom should be considering whether today's regulatory approach to the pricing of superfast broadband services is supportive of *future* investment in ultrafast services. We are concerned, however, that the proposed model is actually more focused on assessing whether Openreach's prices are cost reflective based on a series of restrictive assumptions about future cashflow on assets invested in to *date*. In particular, the proposed model appears to be designed to bake in take-up assumptions that reflect the current level of competition and take no account of expansion by Virgin or entry by Duct and Poles Access (DPA) providers. Moreover, modelling future cashflows on a "technology constant" or "demand constrained" basis will tend to support investment that maintains that constant technology – i.e. it is assumed to be efficient to sweat the assets already invested in on the basis that these are – under the modelled assumptions – sufficient to meet demand.

### **The proposed NGA modelling approach will not encourage investment**

43. As discussed in Section 2, encouraging investment in access networks requires an environment in which potential investors can identify opportunities to generate future cashflows that will payback and earn returns on the upfront investments made. Any decisions by investors will be made against a backdrop of significant uncertainty and risk around the timing and pace of demand growth, willingness to pay and technological change.
44. As also discussed in Section 2, the risks of regulatory failure in seeking to model and forecast annual costs of supply and then using this to assess the reasonableness of pricing/profitability are significant. The focus of the proposed modelling exercise would heighten rather than mitigate these risks. In particular, the focus of the proposed model is exclusively on the technology deployed by Openreach to supply its current portfolio of superfast access products – i.e. VDSL2. No consideration is being given – at least in this consultation and modelling exercise – to the costs and potential revenue opportunities that would drive investment decisions in alternative technologies whether by Openreach or other providers. The model will not capture any impact from the anticipated rollout of new technologies such as G. fast, DOCSIS3, FTTP, nor will it capture any impact from the potential emergence of new technologies (or more economic means of delivering existing or developing technologies). Both of these factors would directly impact the level of demand for VDSL2 and the economic life of assets deployed.
45. Further, the proposed model would take a very long-term view (i.e. 40 years +) of cashflows that could be generated by a hypothetical efficient investor in VDSL2 technology – i.e. it is unrealistically assumed that there would be no, or very limited, investments in alternative, higher

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capability technologies by any other investor over this long period. By adopting such a long-term view and assuming a constant technology into the future, the proposed model would be, it seems, “demand constrained” in the sense that the underlying assumption is that long-term customer demand can and will be met from the VDSL2 technology being modelled. Our concern, therefore, is that, by design, the model would fail to provide any real insight into the recognised future investment challenges and the commercial basis on which any investment decisions would actually be taken.

46. Moreover, the model seems likely, if designed as proposed, to generate a wholly misleading set of annual costs of supplying VDSL2 products; i.e. costs would be inappropriately defined based on an assumption that the assets deployed to date will be heavily utilised long into the future. This means that, the annual capital charges that would be set under the economic depreciation approach will be shaped by the wholly unrealistic “demand constrained” approach proposed. The risk is that the modelling approach becomes self-fulfilling if it then results Openreach being required to align its prices for its current superfast portfolio to these modelled costs; prices will be at levels that require high utilisation of existing assets. This will discourage investment in alternative technologies and, therefore, constrain demand for faster access speeds that would otherwise be expected to materialise.

### **The proposed NGA modelling approach is not adequate to make a ‘Fair Bet’ assessment**

47. Openreach is concerned that Ofcom intends to use this model to assess whether the ‘*fair bet*’ on the investments made to date in the upgrade of the Openreach network has been realised. Payback on those investments has still not been achieved and will not be achieved before the end of the forthcoming market review period. Any finding of current ‘over-recovery’, which takes into account the initial investment risks, could only be made by reference to the modelled capital charges (depreciation and allowed return on the capital base) in each year up to the end of the market review period where those charges reflected demand *beyond* the end of this market review period. If Ofcom were to use the model proposed in this consultation, the ‘fair bet’ at the point the investments were sunk would therefore be assessed by reference to a model that not only had hindsight knowledge of actual demand to date, but also projected the wholly unrealistic view of future demand for services utilising those assets.
48. Openreach has separate, and significant, concerns about using the costs of a ‘hypothetical efficient operator’ where those costs differ from the costs actually incurred by Openreach. If the suggestion is that, even under the proposed scorched node approach, a more efficient network design could have been deployed, this would again risk applying hindsight bias to real time decisions made by Openreach around where, when and how to deploy a new technology in the face of highly uncertain future demand.
49. The over-riding concern here is that adopting the approach proposed in this consultation will mean that the assumed annual cost of supplying VDSL2+ to date will tend to be understated because the risks to the future cashflows that can be generated from those assets will be overstated. There is a real risk that the model would present a view on the projected profitability in this 3 year period that would be overstated and would therefore also be a flawed basis on which to assess whether the fair bet on Openreach’s investments to date had “run its course”. The risk of regulatory failure here is very high. Openreach’s current returns could be considered excessive and the level of risk faced at the point of investment could be considered already sufficiently ‘rewarded’ based on risky (and even on Ofcom’s view, unrealistic) projections about demand for VDSL2 based products long into the future.

## **Adjusting the proposed model parameters and assumptions**

50. We acknowledge that the concerns raised above could be addressed, to an extent, through adjustments to modelling parameters and to input assumptions, e.g. by using lower demand and shorter asset lives to reflect these risks. Our detailed responses below are made in this context as far as possible.
51. Ofcom may also consider that the model would simply offer a reference point from which it may be able to run sensitivities and take account of these broader strategic factors before making any firm policy proposals about whether any price regulation in this three year period was necessary. However, we remain concerned that the consultation on the modelling exercise is taking place with no clear link into these strategic considerations and this should be addressed before the model design is finalised.

## **Detailed comments on the NGA modelling approach**

52. Below are Openreach's detailed comments regarding section 3 of the consultation document.

### **Choice of NGA technology**

53. Ofcom proposes to base modelled costs on those of a national efficient operator, building an NGA network using FTTC and VDSL2 technology.<sup>7</sup> Whilst we acknowledge that current VDSL2 FTTC technology will remain the predominate technology used by Openreach to deliver NGA services during the market review period<sup>8</sup>, this somewhat misses the point that future investments in substitutes will determine the demand for VDSL2 services over the period of Ofcom's proposed financial analysis (40 years+). Since the demand for, and the economic life of, VDSL2 services will be determined by the emergence of services using new technology, Ofcom's proposed approach is flawed as it would ignore costs and potential revenue opportunities that would drive investment decisions in alternative technologies (whether by Openreach or other providers).
54. Therefore, Openreach proposes the model is changed to incorporate the potential emergence of and impact from anticipated new technologies.
55. Moreover, Ofcom seeks to understand the efficiently incurred costs of the deployment BT has made.<sup>9</sup> If the suggestion is that, even under the proposed scorched node approach, a more efficient network design could have been deployed, this would risk applying hindsight bias to real time decisions made by Openreach around where, when and how to deploy a new technology in the face of highly uncertain future demand. It is unreasonable to assume Openreach (or any operator for that matter) could have deployed a network reflecting current supply chain efficiencies and have perfect foresight as to the most efficient roll plans. For example initial costs would reflect increased rollout costs to deliver contiguous areas and increased costs in early years due to technology evolution. Using current supplier input costs, costs for current deployment methods or the costs of an optimised footprint would therefore clearly be unfair and inappropriate in any meaningful 'fair bet' assessment. Ofcom must use Openreach's actual costs of deployment as to do otherwise would bake in significant hindsight bias in its assessment of the 'Fair Bet'.
56. Openreach also notes Ofcom's approach ignores regional variances in costs; these variances can be considerable.

### **Bottom-up modelling approach**

57. Regardless of whether a bottom-up or top-down approach is taken, as outlined above, the

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<sup>7</sup> Para 3.8

<sup>8</sup> Para 3.5

<sup>9</sup> Para 3.6

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proposed approach to the technical and dimensioning assumption (deriving from first principles how many bits of each network element is required for a given level of geographic roll out and end customer volumes) must not be prone to hindsight bias and therefore Openreach's historic actual costs should be used for historic periods.

58. Ofcom considers bottom-up modeling will provide cost estimates that are more robust than top-down estimates<sup>10</sup> and for this reason prefers a bottom-up approach rather than a top-down approach. As Ofcom essentially acknowledges, the accuracy of the cost estimates generated by the model are of paramount importance in a bottom-up approach.
59. In this context, it is imperative that the underpinning input cost assumptions and scaling factors driving the model outputs are a good reflection of reality. Openreach's preliminary view is that there are a number of assumptions which do not meet this test. For example, it seems the amount of network equipment required is based on traffic forecasts<sup>11</sup>, which was one of many inputs when dimensioning the commercial deployment. Solely relying on traffic forecasts would ignore other key dimensioning criteria and, in particular, objectives to achieve levels of service availability or Total Homes Passed (**THP**). Moreover, it is unclear how Ofcom intends to drive the model outputs, for example will it focus on take up figures or THP.<sup>12</sup> This is a critical assumption to get right as a model driven by THP is likely to generate much higher costs than one based on take up and be more reflective of the decisions made when building the network and therefore the efficient costs.
60. In any bottom-up model there will be a tension between complexity (the level of detail modelled) and the accuracy of the outputs (how the outputs match reality). Ofcom has not struck the right balance. The proposed network design, component count, and build assumptions are not detailed enough to capture all of the costs. Further, this lack of detail will also create unrealistic relationships between volumes / coverage and the network elements required / costs to serve. Moreover, there are significant regional variances in deployment costs. Over-reliance on simple averages to drive model outcomes will tend to understate the impact of these differences. The proposed model is likely to significantly understate costs (this is covered in more detail in section 4 below) and Openreach would expect Ofcom to develop and consult on a more detailed model which more accurately reflects actual 'real world' costs of NGA.
61. Openreach also notes:
- Ofcom do not explain how it would estimate a Kilobytes per second (Kbps) peak traffic parameter, e.g is this in line with the year on year growth and forecasted end user demands Openreach modelled?; and
  - It is not clear how Ofcom intends to deal with replacement of assets before the end of their useful life due to actual demand outstripping demand as forecasted at the time of deployment.

Openreach requests Ofcom to clarify its approach to these two issues so that Openreach can meaningfully comment on its approach.

### Scorched node approach

62. We agree with Ofcom that a scorched node approach should provide a closer match to Openreach's actual overlay FTTC network as compared to a scorched earth approach<sup>13</sup> and that it is important that the model reflect Openreach's actual costs.<sup>14</sup> However, in adopting its scorched

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<sup>10</sup> Para 3.12

<sup>11</sup> Para 3.11

<sup>12</sup> Para 3.14

<sup>13</sup> Para 3.24

<sup>14</sup> Para 3.19

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node approach Ofcom seems to assume there are no requirements for new civil infrastructure<sup>15</sup> whilst conversely acknowledging that new civil infrastructure is required.<sup>16</sup> Openreach asks Ofcom to clarify precisely what civil infrastructure costs are to be included in the model. The NGA deployment required significant network build, not only in cabinets and exchanges<sup>17</sup> but also in access network more generally. Therefore excluding or adjusting downwards these would be inappropriate. Openreach does not consider Ofcom's currently proposed network topology aligns with the reality of the Openreach network. Accordingly, Ofcom must adjust its model to reflect all civil infrastructure costs incurred in NGA network deployment.

### Network scope – dimensions and geography

63. Ofcom does not articulate why it has excluded areas part funded by BDUK or other state intervention from its model<sup>18</sup> but none the less has taken a provisional decision to do so. Openreach does not necessarily agree that including these areas at a later date would not affect the overall structure of the model.<sup>19</sup> For example, BDUK will share FTTC-like enhancements like Copper Rearrange (CuRe) and Fibre To The Remote Node (FTTRN). Openreach requests Ofcom to clarify its reasoning for excluding these areas and why it considers that including them later would not affect the structure of the model so that Openreach has an opportunity to respond fully to its preferred approach.
64. Openreach disagrees that significant further commercial rollout is not expected via three separate programmes.<sup>20</sup> Further, the expected future build will utilise various solutions (FTTRN, G.fast, Vectoring and CuRe), which will have significantly different capex and opex cost profiles. This means that Ofcom's model approach will not capture significant expected costs to support NGA.
65. Openreach also notes:
- It is imperative that the large regional variations associated with the commercial rollout of FTTC, which drive significantly different costs (e.g. longer distances to cab locations creates longer line lengths, more civils, more ducting, more duct blockages etc.), are accurately reflected in Ofcom's model. For example, given Ofcom does not intend using network route distances to drive the modelled costs but instead use '*snap to road*' methodology listed in the modelling documentation, Ofcom's approach risks significantly understating actual deployment costs in these locations. Openreach requests Ofcom to clarify how its modelling will adequately deal with regional variation in costs; and
  - Notwithstanding our comments about the exclusion of subsidy areas, it is important to note that costs such as capacity management and in-life repair are not included in the initial BDUK build costs and hence are not subject to any subsidy arrangements. In order that the correct costs of NGA excluding subsidy are modelled, only costs that are subsidised should be excluded from the model. Openreach requests that Ofcom adjust its model in this respect.

### Span of networks in scope

66. The diagram in figure 3.1 is very simplified and, for the avoidance of doubt, Openreach considers that the correct span of network in scope should be all of the network elements deployed for NGA including spine costs and deployment of switches and infrastructure at parent/child exchanges.

### Timeframe

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<sup>15</sup> Para 3.19

<sup>16</sup> Para 3.18

<sup>17</sup> Para 3.23

<sup>18</sup> Para 3.26

<sup>19</sup> Para 3.26

<sup>20</sup> Para 3.28

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67. Openreach has no comments regarding 2007/08<sup>21</sup> being the start year for the model.
68. Openreach considers that the focus of any model based solely on VDSL2 must be no longer than the 20 years considered when the decision to invest in the Openreach network was taken. The model should focus on payback in that period and, in particular, on the projected position at the end of this market review period. Openreach does not agree that a 40 year time horizon is appropriate especially as the primary purpose of the model is to assess the 'Fair Bet'<sup>22</sup> and the original BT business case had a 20 year time horizon.
69. When creating volume forecast out to 2027/28<sup>23</sup>, Ofcom must be mindful of how the market is likely to develop. Weight should be given to: (i) expected levels of demand at the point investment decisions were made; and (ii) current risks that investments in higher speed technology (whether by Openreach or others in G.fast, FTTP or DOCSIS3) will reduce demand for VDSL2 technology in the 20 year period. When creating cost forecasts over the same period, the model must capture this risk of technology shifts and not assume economic usefulness of assets beyond the 20 year framework. Openreach would be happy to discuss this further at Ofcom's convenience.
70. Ofcom then proposes to extend the period of the model to a 40 year horizon. Ofcom do not explain why this would be an appropriate approach for its current purpose save to say that "a 40 year horizon is sufficient to capture long run relationships".<sup>24</sup> Openreach considers, as stated above, that the 20 year time horizon of the original business case is the correct timescale for the assessment. To do otherwise would project a wholly unrealistic view of future demand for services utilising the NGA assets. Openreach requests that Ofcom clarify in detail why it considers a 40 year time horizon to be required so that Openreach has an opportunity to meaningfully respond on this point.

### NGA services in scope

71. Openreach has no further comments at this time regarding NGA services in scope (connections, rentals and ancillary services.<sup>25</sup>)

### Shared CGA and NGA Costs and Common Cost Recovery

72. Ofcom notes that there is common infrastructure shared between CGA and NGA services and that there are also common costs shared between CGA and NGA services<sup>26</sup>. Ofcom states that they will consider common costs as a part of a top down assessment which will fall outside of the scope of NGA bottom up modelling.<sup>27</sup>
73. We agree that there should be no over or under recovery of costs in the WLA or other regulated markets<sup>28</sup>. In this consultation, Ofcom are using a bottom up approach to model the incremental costs incurred in providing a fibre based service.<sup>29</sup> Openreach notes that NGA services attract both direct and common costs within the RFS. It is imperative, therefore, that common costs driven by NGA are included in the 'fair bet' assessment. To exclude common costs completely would understate the true cost of supplying NGA services.

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<sup>21</sup> Para 3.31

<sup>22</sup> Para 2.13

<sup>23</sup> Para 3.35

<sup>24</sup> Para 3.34

<sup>25</sup> Para 3.36

<sup>26</sup> Para 3.38 and 3.39

<sup>27</sup> Para 3.40

<sup>28</sup> Para 3.40

<sup>29</sup> Para 2.22

## 4. The Proposed NGA Model Design

### Question 4.1: Do you agree with our proposed NGA modelling design? Please provide reasoning for your answers.

74. Openreach does not agree with Ofcom’s proposed NGA modelling design. In this section are Openreach’s detailed comments relating to the service volumes module, Network module and cost module and the approach to model calibration.

#### NGA service volumes model

75. The overall design of the NGA service volumes model in terms of the flows appears logical and reflects most of the volume flows that would drive the market and Openreach’s installed base in a steady-state, “technology constant” future. However, the approach will clearly suffer from the extreme limitations of that key assumption – the supply of NGA services cannot be viewed as steady-state particularly over the long time period for which service volumes are being forecast. Furthermore, even under those restrictive assumptions, there are a number of areas where the structure, key assumptions and data sources used for forecasting can be improved. These areas of improvement include:

- Use of Household growth to forecast the number of fixed line households;
- Calculation of Estimated Openreach residential and business lines and Openreach broadband lines;
- Forecast methodology of UK Openreach fibre broadband lines; and

#### Use of Household growth to forecast the number of fixed line households

76. Ofcom proposes to use Government household growth projections to forecast total UK households to 2028/29. The model uses this as the primary input, in combination with proportion of households that are mobile only, to forecast the number of fixed line households. Over the forecast period (2016/17 – 2028/29) absolute UK household growth projections vary between an additional 238k and 266k households per annum.

77. Government household growth projections are not the best and most accurate predictor of fixed line household growth.

78. Comparison of historic growth in UK households and UK dwellings<sup>30</sup> confirms that absolute growth of dwellings (combination of new build, conversion, change of use to residential minus demolitions) consistently falls below the absolute growth in UK households – see Figure 1.

**Figure 1. Department for Communities and Local Government (DCLG), Total UK Household and UK Dwelling, 2010-2014**

|               |                  | 2010   | 2011   | 2012   | 2013   | 2014   |
|---------------|------------------|--------|--------|--------|--------|--------|
| UK Households | Total (k)        | 26,301 | 26,491 | 26,729 | 26,956 | 27,210 |
|               | Net movement (k) | 215    | 190    | 238    | 227    | 254    |
| UK Dwellings  | Total (k)        | 27,448 | 27,614 | 27,767 | 27,914 | 28,073 |
|               | Net movement (k) | 182    | 166    | 153    | 147    | 159    |

<sup>30</sup> Source: DCLG, Live tables on dwelling stock, <https://www.gov.uk/government/statistical-data-sets/live-tables-on-dwelling-stock-including-vacants>.

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79. The DCLG measure of UK dwelling stock shown in figure 1 is aligned with a breakdown of Net supply of housing statistics,<sup>31</sup> which are also published by the DCLG. The breakdown of Net supply of housing provides detailed statistics on the growth in addressable premises that can be connected with a new line (new build supply, dwelling conversions and non-dwellings brought into residential use) minus removal of lines due to demolition of dwelling, and therefore is a more appropriate measure of growth in fixed line households (minus impact of mobile-only homes).
80. Given actual house build statistics indicate that Government forecasts for new house builds are over-optimistic, i.e. less houses are actually built, we deem this an inaccurate measure of additional premises that can be addressed with a fixed line. Accordingly, Ofcom should exercise caution in adopting Government house build projections. Statistics released on the number of new house builds completed in 2015<sup>32</sup> and future forecasts of house build activity<sup>33</sup> confirm a shortfall in new build housing supply compared with government ambition for growth in UK households as reflected in their growth projections.<sup>34</sup> If this shortfall was to be maintained for any duration of the forecast period to 2028/29, the forecast size of the fixed line households would be inflated compared with the actual number of households with a fixed line. Between 2010 and 2014 (inclusive) the shortfall in additional UK dwellings compared with UK households amounted to 299k.
81. In light of the above, Ofcom should base projections on UK dwelling growth rather than UK household growth as this will provide a more accurate reflection of growth in fixed line households (after accounting for mobile-only households). In the absence of accurate UK dwelling growth forecasts we advocate the use of UK household forecast with an adjustment factor applied to account for the lower absolute growth in dwellings evident in recent years and projections of future housing supply.

### **Calculation of Estimated Openreach residential and business lines, and Openreach broadband lines**

82. Openreach has significant concerns about the calculation of estimated residential and business lines, and Openreach broadband lines.
83. The calculation of the forecast of Openreach residential and business lines is a key step in the model design. This forecast directly impacts the forecast of Openreach broadband lines and consequently the forecast of Openreach fibre broadband lines as part of that total.
84. The model flows depict that 'Forecast number of Openreach residential and business lines' is driven by: (i) forecast of number of business premises; and (ii) an assumption of Forecast Openreach penetration. It is not clear within the model where and how the assumption of Forecast Openreach penetration is calculated and how it drives the Openreach residential and business lines total. The forecast of Openreach penetration is a critical factor and presumably (unclear due to current model design) predominantly or singularly impacted by competitor network volumes. If this is the case, then Ofcom must explicitly explain how it will forecast the competitor network volumes and the impact this has on Openreach penetration. Without this explanation, Openreach is unable to determine whether the methodology to forecast Openreach residential and business lines is robust.

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<sup>31</sup> Source; DCLG, Live tables on net supply of housing, <https://www.gov.uk/government/statistical-data-sets/live-tables-on-net-supply-of-housing>

<sup>32</sup> NHBC reports continued house-building growth in 2015, <http://www.nhbc.co.uk/NewsandComment/UKnewhouse-buildingstatistics/Year2015/Name,64397,en.html>

<sup>33</sup> Leading Edge, UK Construction Market Forecast 2016 – 2020, <http://www.lead-edge.co.uk/downloads-and-reports/construction-forecast/>

<sup>34</sup> Inside Housing, Housebuilding rises but numbers still below target, <http://www.insidehousing.co.uk/housebuilding-rises-but-numbers-still-below-target/7014122.article>

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85. Openreach has similar concerns about the methodology to forecast Openreach broadband lines. Ofcom states that the forecast of Openreach broadband lines also takes into account “*historic growth as an indication and Analysys Mason’s forecasts*”<sup>35</sup>. Without clarity regarding how these forecast volumes will be calculated (both flows and methodology) Openreach is unable to determine whether this aspect of the model design appropriately captures the relevant dynamics that shape the forecast of Openreach broadband lines. As per the forecast of Openreach residential and business lines, the impact of competitor networks is the most critical factor that needs explicit inclusion in the model design and, accordingly, it is imperative that Ofcom explain how the forecast of the competitor network volumes and impact on Openreach broadband lines forecasts.
86. Openreach would generally observe however, that the UK broadband market has become increasingly competitive at the network provider level with introduction of numerous small alternative operators (e.g. Hyperoptic, Gigaclear) and important changes to Virgin Media’s network footprint and services it offers and the footprint of its network. The further evolution of Virgin Media’s NGA portfolio (via DOCSIS3.1 and beyond) and their expanded reach (4m additional premises by 2019 via Project Lightning) is in our view a significant factor impacting the forecast of Openreach lines and broadband lines. We therefore recommend that a forecast of competitor volumes, specifically total lines and NGA broadband lines, are included within the model design to accommodate differing scenarios.

### Forecast methodology of UK Openreach fibre broadband lines

87. Ofcom states that the forecast of Openreach fibre broadband lines is based upon “*various forecasts of fibre take-up which currently comprise but ultimately are not necessarily limited to forecasts from: 1) BT; 2) Other CPs; and 3) Analysys Mason*”<sup>36</sup>. In addition, within the NGA service model the following note is referenced against the row covering Openreach fibre broadband lines: “*Forecasts based upon assumed fibre broadband growth that is consistent with March 2013 WIK report on 'Estimating the cost of GEA' up until 2019/20*”.
88. Given the numerous sources of forecast data, and therefore lack of clarity of how the forecast volumes will be calculated (i.e. what, if any, specific quantified contributing factors will drive this forecast), Openreach is unable to determine whether this aspect of the model design appropriately captures the relevant dynamics that will shape forecast take-up of Openreach NGA services. For example, it is not clear what the forecast will assume with regards to: (i) consumer trends in data consumption; and (ii) the need for download and upload speeds over the forecast period. Both of these factors contribute to take-up of NGA services offered via competitor networks (e.g. Virgin Media) as highlighted in section 2 will also have an impact.
89. Without inclusion of the specific data sources and clarity regarding the methodology used within those data sources, Openreach cannot determine if this part of the model design sufficiently captures the relevant dynamics driving take-up of Openreach NGA services. We recommend that this part of the model design is explained more clearly with specific disclosure of the data sources and what elements of the source data are used in the forecast. Furthermore we recommend that the most important dynamics impacting forecast take-up of Openreach NGA services (e.g. competing NGA networks) are explicitly included as part of the model design rather than implicitly assumed within the various data sources used to calculate the forecast.
90. Openreach considers that a model based solely on VDSL2 technology does not accurately reflect the volumes of all NGA technologies both current and those planned or likely to be introduced in future. Openreach’s announcement to deploy 10m premises with G.Fast and a further 2m premises with FTTP confirms that the installed base of NGA volumes will be based on a more

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<sup>35</sup> Para 4.8

<sup>36</sup> Para 4.9

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dynamic mix of different technologies over the forecast period to 2028/29. Beyond that it is likely that further technology developments and NGA investment decisions will drive a more varied portfolio within the forecast period.

## Network and Cost module

91. Due to the interrelated nature of the two modules developed by Cartesian (Network and Cost), Openreach has combined its response to these proposals in this section. We also provide specific comments in relation to, not only the consultation sections related to these two modules, but also the Cartesian report of 9 May 2016 titled “*Wholesale Local Access Market Review: NGA Cost Modelling – Network & cost module documentation V1*”.

92. Openreach has a large number of detailed comments and in particular highlights:

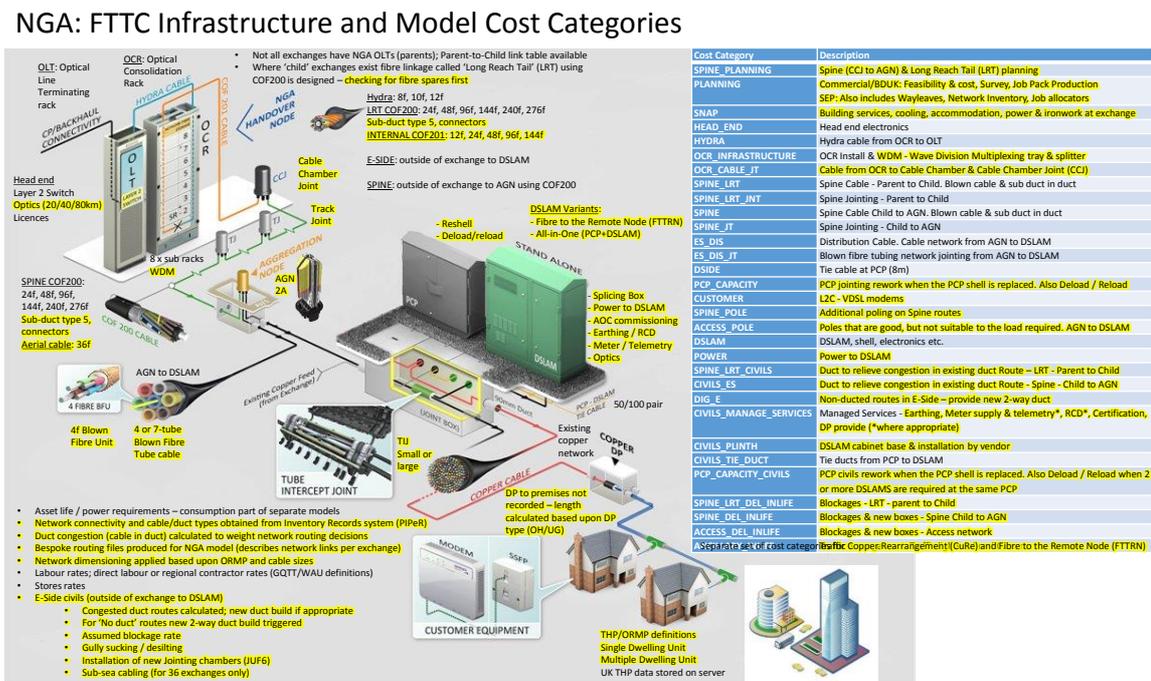
- Costs components that seem to be missing and therefore the proposed approach will underestimate costs;
- Proposed assumption or parameter that do not reflect the actual network; and
- Areas where Ofcom’s proposal is unclear and clarification is required in order to provide Openreach’s comments.

93. Due to the large number of comments, Openreach has summarised its comments in three tables in Annex 1 which refers to specific section of the consultation / Cartesian report. Openreach requests an early discussion with Ofcom to work through these so that its comments can be appropriately addressed.

94. For illustrative purposes and to show the extent of the omissions of cost, the shaded areas in the diagram below are costs which Openreach incurs in NGA but are missing from the Ofcom model.

95. It is imperative that these omissions are addressed, that the parameters used by Ofcom are updated to reflect reality and that the necessary clarification are provided to allow Openreach an adequate opportunity to respond to this consultation.

**Fig 1 – Costs that are missing from the Ofcom model (those highlighted in yellow).**



## Ofcom's spreadsheet model

96. As outlined in Annex 1, Openreach has a large number of concerns about the Cartesian model approach (which is used to create the spreadsheet model). Openreach would make the following further comments in relation to the spreadsheet model<sup>37</sup>

- Openreach has concerns about the integrity of the formulas in the spreadsheet. For example,
  - If you adjust the service volumes for 1 DSLAM in 2016/17 and zero the other years in 'Link\_ServiceVolumes' then you would expect to see the network quantities for 1 FTTC installation.
  - However, in the 'Calc\_Network' sheet the pre-stored E-Side and Backhaul cable distances are shown (these should be zero).
  - In 'Calc\_NetReq' 980 x OCR chassis are required in years 2027/28 and 2036/37
  - In 'Calc\_NetReq' OCR tie cable quantity fixed at 30m until 2036/37 when it increases to 29,400m
  - In 'Calc\_UnitCapex' the E-side cable cost totals are missing

Openreach requests that Ofcom clarify precisely how it will ensure the spreadsheet model works as designed and what checks it will undertake to ensure the quality of the model.

- Network Architecture: A review of the network components in the spreadsheet has shown that the network architecture - how the network fits together - is incomplete. A diagram showing the Openreach NGA FTTC network is provided in fig 1 above to clarify the architecture and naming conventions. Openreach notes that volumes are an order of magnitude greater than expected (24 million). Given the step changes in build and capex to allow for this growth it could not be the case that that a linear relationship between volumes and capex would be maintained;
- Inventory Detail: the model will be used to assess the 'fair bet' but the level of modeling granularity is very simple compared to the Openreach models used for deployment. As explained earlier, Ofcom will need to increase the level of detail in its model in order to more accurately reflect reality. Ofcom's approach is 'naïve' and over-simplified e.g. there is no allowance for real world sub-optimised outcomes resulting from uncertain demand;
- Network Routing Approach : As highlighted in Annex 1, NGA capex is sensitive to routing variations across the UK. Cartesian are to use a 'snap to road' technique for the UK. Openreach used this originally but progressively moved to digitalised records throughout the Commercial deployment because it was more accurate. Actual costs are likely to be significantly higher than the Cartesian model would estimate because the 'snap to road' technique will not identify requirements to build new duct when switching routing methods (i.e. where duct congestion and no-duct route assumptions shift).
- Other assumptions: there are a significant number of material assumptions missing from the spreadsheet relating to both capex and opex costs. Please refer to annex 1.

## Cost recovery and service costing

97. Ofcom will consider Economic depreciation as a potential method of modelling cost recovery.<sup>38</sup> Conceptually, economic depreciation attempts to capture the period-by-period change in the

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<sup>37</sup> p38, 2016 NGA model

<sup>38</sup> Para 4.29

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market value of an asset, reflecting an assessment of present value of future cashflows the asset is expected to be able to generate over its useful life. Ofcom's cost recovery model would therefore generate depreciation charges for VDSL2 assets in each year that are driven by whatever assumptions are made about future demand and utilisation of those assets. Any assessment of cost recovery – e.g. in considering the 'fair bet' on initial investments in the assets or in assessing the recovery of costs in the upcoming market review period – using the proposed Economic depreciation approach will therefore be hugely sensitive to these assumptions.

98. Openreach notes that this therefore presents a major limitation on the extent to which this proposed modelling approach – aligned with a 40 year + view of cashflows which would appear to assume "technology constant" supply and limited, if any, market entry – should drive policy decisions in relation to the supply of VDSL2 services in this market review period.
99. As outlined above, in reality there is expected to be significant technological change and growth in competition that will increase the availability of ultrafast services that will substitute demand for superfast VDSL2 services over time. The risk is that Ofcom adopts an approach to assessing cost recovery by reference to Economic depreciation charges based on implausible assumptions about the ability of the hypothetical operator to generate future value, way beyond the end of the market review period, from the VDSL2 assets in the face of growing demand for access speeds that cannot be delivered by that technology and increased competition from ultrafast technologies. If such an approach required Openreach to align short term prices for VDSL2-based services to levels set by reference to annual depreciation charges driven by such an approach, the ability to recover the initial investment costs in VDSL2 would be challenged, undermining the 'fair bet' and having adverse impacts on long term investment incentives.
100. This reinforces the importance of adopting a modelling approach that considers payback over a much shorter period and captures both the risks present at the point of initial investment and the ongoing risks and challenges arising from changing technology, shifts in the nature of demand and increased competition.

### Approaches to Calibration/cost verification

101. Ofcom propose to compare outputs of any NGA cost modelling work with actual operator data to ensure its reasonableness.<sup>39</sup> Ofcom provide two examples of how they might calibrate their model; (i) using existing national deployments of FTTC such as BT's RFS and (ii) using other NRA NGA models.<sup>40</sup> We note that there are a number of risks involved in calibrating a hypothetically built NGA model with the reality of Openreach's fibre rollout regardless of the calibration benchmark used.

102. We discuss each of these in relation to Ofcom's example calibration methods below.

#### Calibration against existing network deployments of FTTC e.g. NGA in BT's RFS

103. The RFS cost attributions are based on a number of different methodologies for NGA assets. The RFS does not necessarily account for the relative aging of assets (i.e. NGA assets are generally newer than CGA assets) and may give an artificially low NGA service cost. Adjustments to RFS information may be required for calibration purposes and to ensure a like for like comparison

#### Calibration against other NRA's NGA models

104. Other NRA's NGA models should be based on the specific network topology in their respective country. The UK has different geographical challenges to overcome when rolling out a fibre network. Any model calibration against other NRA's NGA models needs to allow for

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<sup>39</sup> Para 4.34

<sup>40</sup> Para 4.34.1 and 4.34.2

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differences in geographic topology

105. There could be significant differences between the other NRA's population density and the UK's. For example, the cost of NGA in some other countries may be less because of high population densities and a number of Multiple Dwelling Units (MDUs) where a number of superfast broadband customers can be served for a relatively fixed investment. The population dispersion in the UK means that the unit cost of providing NGA access in rural areas is likely to be significantly higher.
106. We recommend that Ofcom use Openreach's actual cost base to calibrate any bottom up model. A hypothetical model is not reflective of the reality behind our fibre investment and rollout. Modelling a network that is built from day one to serve a high capacity is unreasonable and would incorporate hindsight bias i.e. Openreach could not have realistically forecast take-up would accelerate at the rate at which it has.

## **Annex 1 – Detailed comments on Network and Cost modules and Cartesian Report**

### **Costs that are missing**

| <b>Document</b> | <b>Para</b> | <b>Comment</b>  |
|-----------------|-------------|---|
| Cartesian       | 3.1         | The diagram is missing Long Reach Tails(LRT), the network between the NGA handover point called the 'parent' exchange, and the 'child' exchanges, and spine.  |
| Cartesian       | 3.4         | Openreach may need to reshell or deload/reload PCPs. New PCPs provided for CuRe were out of scope initially but not for later FTTC implementation.  |
| Cartesian       | 3.13        | Tie duct provision is missing. Openreach allows 8m (either 1 or 2-way).   |
| Cartesian       | 3.16        | Meters and telemetry line, earthing components (mats, spikes, RCD), DNO power connection are all significant costs missing from the DSLAM component.  |
| Cartesian       | 3.26        | It is incorrect that there are no civils required/existing duct is used for E-side cabling. New duct is required for no-duct routes and civils are required for both congested ducts and to allow for duct blockages. |
| Cartesian       | 3.29        | Aggregated cables should also be included in the spine design using a dedicated Aggregation Node.   |
| Cartesian       | Fig 10      | Spine Aggregation Node needs to be included.  |
| Cartesian       | 3.31        | Sub-duct is also required for COF200 spine cable.   |
| Cartesian       | 3.35        | Actuals will differ from modelled when cable is only available in certain quantities e.g. per 500m drum   |
| Cartesian       | 3.38        | Even if there is spare fibre for LRT and we use that spare fibre, Openreach still provides 1km of fibre for connection purposes.  |
| Cartesian       | 3.44        | Space, additional power, cabling, and trunking are missing.   |
| Cartesian       | Fig 22      | Headend, modem and batteries are missing.   |

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### Annex 1 (continued)

#### Assumption or parameter does not reflect the actual network

| Document  | Para   | Comment  |
|-----------|--------|--|
| Con Doc   | 4.13   | Exchange and DSLAMs enablement dates will be different. Openreach considers it would be appropriate to keep these separate when driving downstream equipment volumes as this is what happens in reality. |
| Cartesian | 3.5    | The size and fullness of the PCP may require some uplift work which can be a significant cost (e.g. compression, re-shell, de-load/reload).  |
| Cartesian | 3.5    | 4 types of DSLAM (2 from each vendor) would need to be considered. Also going forward the use of 'All-in-one' cabs, which are a result of CuRe needs to be included.                                     |
| Cartesian | 3.11   | Duct depth is to the top of the duct. However, the cable lies at the bottom of the duct and this should be accounted for in the calculations.  |
| Cartesian | 3.11   | The DSLAM might be across the road which would involve excavating different surface types which attract different costs (soft, footway and carriageway rates).   |
| Cartesian | 3.18   | Openreach also deployed a significant number (~14.5k) of large (256 max capacity) ECI DSLAMs.  |
| Cartesian | 3.18   | The DSLAM capacity for each DSLAM type ignores early programme configuration ('day one type') and will result in understated costs.  |
| Cartesian | 3.22   | Service adoption also influences spine dimensioning.   |
| Cartesian | 3.22   | ECI 256 port DSLAMs also need to be included.  |
| Cartesian | 3.25   | Openreach's DSLAM selection is derived in relation to take-up rate, THP/ORMP, and uplift ratio. Note that what was modelled may not have been deployed.  |
| Cartesian | 3.30   | Openreach's largest fibre spine is 276 fibres.   |
| Cartesian | 3.31   | Fibre dimensioning should follow Openreach's 'boosted cable' rules.  |
| Cartesian | Fig 13 | May also require 'Long Reach Tail' between parent and child exchange.  |
| Cartesian | Fig 13 | Two types of fibre used in E-Side; COF200 in sub-duct and Blown Fibre Bundle in Blown Fibre Cable.   |
| Cartesian | 3.36   | The duct might be full or a new pole route required.   |
| Cartesian | 3.38   | Openreach have defined the parent-child relationships and calculated the relevant distances -these should be used.   |
| Cartesian | Fig 15 | L2 switch is integrated into the headend (a card in a common backplane) - no need for switch tie cables  |
| Cartesian | Fig 19 | Capacity management costs should be included i.e. additional cards in OLT, additional OLTs, and additional OCRs  |
| Cartesian | Fig 21 | Element dimensioning approach would need to be vendor specific.  |

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**Annex 1 (continued)**

**Assumption or parameter does not reflect the actual network (continued)**

| <b>Document</b> | <b>Para</b> | <b>Comment</b>  |
|-----------------|-------------|---|
| Cartesian       | 4.21        | The costs for business rates, Service Management Centres, disaster recovery, asset Mean Time Between Failure (MTBF), repair, maintenance, fuel, fleet, modems spares and Access Operations Centres (AOC) are missing. |
| Cartesian       | 4.31        | It would be better to calculate per port power including base power and low-power state ports, which were implemented in a firmware upgrade during the Commercial deployment.   |

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### Annex 1 (continued)

#### Clarification required in order to meaningfully comment

| Document  | Para   | Comment   |
|-----------|--------|---|
| Con Doc   | 4.15   | Openreach believes that each type of FTTC build, by year, will need separate capex and opex unit cost.  |
| Con Doc   | 4.16   | It is unclear precisely how Ofcom will estimate the component cost trend. Openreach is concerned that the approach will not reflect actual historic or expected cost trends. Any cost trends will need to account for a complex set of dynamics including one-offs, e.g.: (i) vendor volume discounts or structural changes to costs; and (ii) civills are likely to be more complex if a 2 <sup>nd</sup> cabinet is required. These dynamics will be complex and failing to take account of them are likely to result in grossly inaccurate outputs. |
| Cartesian | 1.3    | As already explained, Openreach does not understand precisely how Ofcom intends to map capacity, coverage and demand forecasts. These assumptions drive component count and therefore costs. It is imperative that Ofcom clarifies its approach so that Openreach can meaningfully respond.   |
| Cartesian | 2.1    | Does the scope include the modem in the customer premises? Openreach considers it should.   |
| Cartesian | 2.6    | Cartesian states that BDUK area costs can be 'easily' excluded. Openreach considers it would be difficult to exclude BDUK costs precisely due to shared costs. Please clarify the exact approach Cartesian intends taking to 'easily' exclude BDUK costs.   |
| Cartesian | 2.10   | Please clarify whether actual route distances will be used or ' <i>snap to road</i> '. Actual route distances are accurate and should be used.  |
| Cartesian | 3.10   | Openreach would expect the same level of detailed logic applied to TIE duct and cable to be applied to each part of the network. For example, spine is as important, probably more so, than ties duct and cable. Could Ofcom clarify its assumptions regarding spine costs e.g. how Aggregation Nodes will be placed.   |
| Cartesian | 3.15   | Please clarify what size cables are used, and how this is derived, and what supplied cable length is assumed.   |
| Cartesian | 3.29   | Openreach does not understand what 'fibre-pairs' refers to.   |
| Cartesian | 3.33   | It is unclear if Cartesian's geospatial analysis approach calculates duct congestion to ascertain whether an alternative route can be used, or whether new duct build is required.  |
| Cartesian | Fig 15 | Please confirm that ' <i>OCR tie cables</i> ' equates to 'Internal COF201 cables'.  |
| Cartesian | 3.45   | Openreach does not understand the statement that rack cost is a yearly recurring capex cost. Please clarify what costs this relates to.   |
| Cartesian | 4.8    | Could Ofcom clarify if 'subscribers' relates to actual take-up? If it does, the assumption will result in a significant understatement of costs compared to the network that was designed and built by Openreach.   |

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### Annex 1 (continued)

#### Clarification required in order to meaningfully comment (continued)

| Document  | Para   | Comment  |
|-----------|--------|--|
| Cartesian | 4.9    | Please clarify precisely how bandwidth is used to dimension network design.  |
| Cartesian | 4.11   | Please clarify precisely what 'utilisation threshold' means; Openreach does not understand what this is or how it is being used.   |
| Cartesian | Fig 22 | Please clarify precisely how the proposed asset lives have been derived so that Openreach can comment on the calculation method and suggest alternatives if appropriate. |
| Cartesian | Fig 23 | Please clarify whether Capex is split between labour and stores.   |
| Cartesian | Fig 24 | Please clarify the basis upon which the cost trends have been derived.   |