Quality of Service for WLR, MPF and GEA

Response to Ofcom's Consultation on proposed quality of service remedies

Non-Confidential Version

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Comments on this response should be sent to:
Mark Shurmer, Managing Director, Regulatory Affairs via email mark.2.shurmer@openreach.co.uk

Foreword

On 31 March 2017, Ofcom published its consultation which sets out its proposals for regulating the quality of Openreach services that are used by telecommunications providers to provide broadband and telephone services to customers and businesses (the Consultation Document).

This submission is provided by Openreach, a line of business within British Telecommunications plc (BT)[1], in response to proposals related to Openreach's business. This document should be read in conjunction with Openreach's other related responses, namely the Wholesale Local Access Market Review and the Narrowband Market Review.

[1] As part of BT's implementation of its formal notification dated 10th March 2017 under section 89C of Communications Act 2003 (the Act) and subject to pre-conditions being met, the Openreach business will be operated by Openreach Limited, which was incorporated as a separate legal entity on 24th March 2017.

1. Executive Summary

Introduction

1. Homes and businesses rely on broadband and Openreach's services more than ever before. We are proud of our track record of delivery since the FAMR and alongside Ofcom we believe we have driven a progressive strategy of superfast broadband delivery and service improvement.

2. We believe that customers and businesses want and expect increasing levels of service performance as broadband services are now central to their lives. We therefore fully support the Ofcom strategy of continuing to uplift service through the WLA consultation process.

3. Our recent performance demonstrates the strength of our commitment to driving up the standard of service we offer to our customers: Openreach has exceeded all 160 Minimum Service Levels (MSLs) so far – proving that we regard MSLs as the *floor* for performance rather than an *aspirational target* or *ceiling*. For example, in 2016/17, our performance (as a national average) was as follows: (i) we exceeded our First Available Date (FAD) MSLs by more than 10% (ii) we exceeded our provision on-time MSLs by more than 4% and (iii) we exceeded our national repair MSLs for the assessed Service Maintenance Levels (SML1 and SML2) by 8.1% and 3.7% respectively.

4. Service is at the heart of the Openreach strategy and we have already developed and communicated a suite of service commitments to our customers, summarised in Table 1 (noting comparison with 2016/17):

Table 1: Openreach 2017/18 service commitments

We have already developed a set of service commitments for 2017/18 to underpin our ambition to improve the customer experience		
For our Provision customers we will:	16/17	17/18
Achieve 95% of ALL customer Provision orders on time by the end of 2017	**93.8%**	**95%**
Halve the proportion of fibre (FTTC) orders that receive an Openreach fault clear in 28 days	**4.9%**	**2.5%**
Ensure customers moving into a new home will have their service ready on agreed date	**76%**	**82%**
Provide more fibre capacity for customers wanting FTTC	**97.7%**	**98.5%**
Improve the speed of delivery on FTTP orders –(% within industry standard of 18WD)	**70%**	**80%**
For our Repair customers we will:		
Ensure that at least 83% of repair customers have service restored on time	**77.9%**	**83%**
Invest in our network health to reduce 183,000 customers experiencing a loss of service	**173k**	**183k**
Halve the customers experiencing multiple faults (3+ repeats faults) and appointments	**-20%**	**-50%**
For our customers with delays we will:		
Ensure customers will not wait longer than 30 days for service to be restored or 90 days an order to be completed	**48550**	**zero**
Ensure we take care of our most vulnerable customers if we cannot resolve their service on time by providing a temporary solution	**-**	**Q3 implementation**
For our customers with appointments we will:		
Consistently deliver low level missed appointments (<2.5%) & ensure we never miss again.	**2.9%**	**2.5%**

5. Additionally we believe that our Fault Volume Reduction (FVR) investments are clear evidence of our commitment to improving service. We recently doubled our annual FVR investment (our 2016/17 spend was double that of 2015/16) and we are planning to continue to invest at this heightened level across the next 3 years. This focus on fault reduction is already starting to produce positive results: we have now halted the rise in the network fault rate (this compares favourably to the c. 5% to 6% year-on-year increase that provided the backdrop to the previous FAMR). On average, a line has a network fault once every c. 3000 days (i.e. it is working >99.9% of the time), and we are committed to improving this year-on-year.

6. We are not complacent, however, and are continuing to take the actions that will drive further service improvements in the future. For example: (i) we continue to deliver *Big Data* and *Test & Diagnostic* capabilities that will enable the next generation of service improvements and (ii) we are expanding and upskilling our workforce to ensure that we have the scale and capability to deliver increasing levels of service.

7. We believe that our recent actions are clear evidence that we share Ofcom's focus on driving up service standards. However, we do have concerns around the details of some of the MSL proposals made by Ofcom in the Consultation Document. MSLs need to align with the following four key principles and we are concerned that this is currently not the case as proposed in the Consultation Document:

    - **MSLs should be achievable**: MSLs are not targets – they are the minimum standards that have to be met. This is an important and essential distinction – MSLs cannot be set as an *aspirational target*, rather they should be a *regulatory minimum* set at a level that a competent operator could be expected to achieve in every region for every SML in every year of the Charge Control period.
    - **Good value for money**: The insightful customer perspective provided by Ofcom in the Consultation Document is very clear: customers want better service but not at <u>any</u> cost. The paramount importance of price (from the customer's perspective) means that it is essential that any investment in improved service should be seen as good value for money. We are therefore concerned that some aspects of the proposed MSLs will not satisfy this requirement and may not align with Ofcom's duty to promote efficient investment.
    - **Fully funded**: If our service improvements are to be sustainable and allow us to consistently deliver good outcomes for our customers moving forward, it is vital that we are fully funded to make the necessary investments in engineers, training, equipment etc. We are concerned that the current proposals do not recognise this principle.
    - **Proportionate and consistent:** MSLs should be set by Ofcom consistently with its statutory obligations, including (i) promoting efficient investment[2], (ii) ensuring that it does not impose or maintain unnecessary burdens[3]; and (iii) ensuring remedies imposed are objectively justified and proportionate to what the condition is intended to achieve[4]. We believe that the proposed MSLs should be amended in order to ensure they are consistent with the statutory obligations and with SLAs and SLGs (Service Level Agreements/Guarantees).

[2]The Communications Act 2003 (the Act), sections 3(4)(d) and 4(8)(aa).
[3] The Act, section 6(1).
[4] The Act section 47

8. We are also concerned that certain aspects of the MSLs might lead to unintended negative consequences. Working together with Ofcom, we believe that we can address those aspects and the points raised above, thereby ensuring that Ofcom puts into place robust, future-proof MSLs to the benefit of consumers.

9. More detail on the four key principles outlined above is provided below:

MSLs should be achievable

10. We broadly agree with the MSLs as proposed by Ofcom and feel that they will drive good outcomes for customers. However, there are some specific elements which we believe are not achievable. Addressing these concerns will make the MSLs more robust.

11. In general terms, we consider that Ofcom's Year 3 on-time repair MSL proposal (93%) is set at the level of an *aspirational target* rather than a *regulatory minimum*. There are several key areas where Ofcom is making overly aggressive assumptions or is misinterpreting key details:

- **Repair On-Time Glass Ceiling:** Openreach's analysis suggests that the Year 3 repair glass ceiling will be 92.2% (nationally – shown in Figure 1 below). This suggests that Ofcom's 93% (90% post MBORC allowance) MSL proposal cannot be achieved across all regions.
- **Regional Variations:** The challenge of meeting a 93% (90%) MSL is made even greater by the requirement to exceed this standard in every region. For example, our forecast for the Year 3 Glass Ceiling drops to 90.7% if we focus on the most challenging areas – as shown in Figure 1 below.

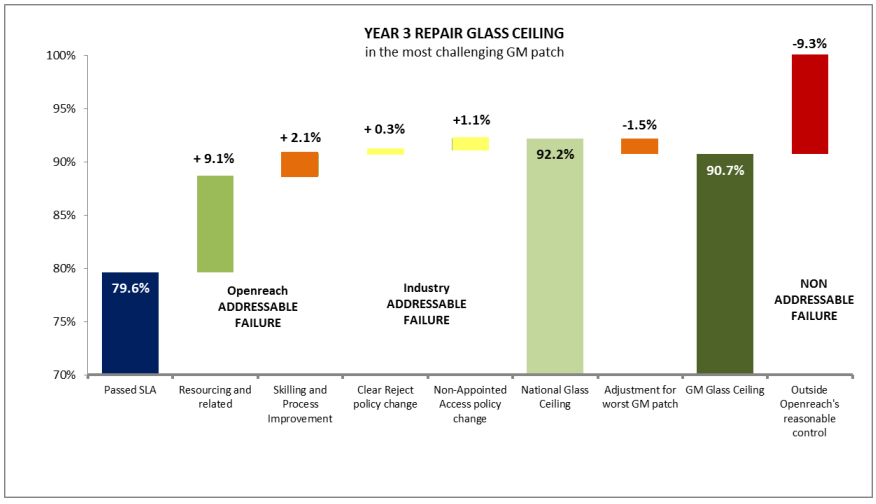


Figure 1: Analysis of the Openreach Repair Glass Ceiling

- **SML Changes:** Openreach cannot prevent CPs from migrating their customers to SML2. As good service is highly important to the industry, CPs may well attempt to *race to the top* of delivered service standards. We therefore need MSLs to be set at a level where we could accommodate additional movement to SML2, rather than baking in assumptions based on the current SML mix.
- **Proposed Glidepath:** Ofcom currently proposes that, in Year 2, the repair MSL should step up by 7% points (from 83% to 90%). This level of uplift in service (in every region and for both SMLs, whilst meeting all of our other obligations and commitments) will require a level of

recruitment and training that is above anything undertaken previously in a single year. The operational impact of this level of change across the workforce, as we support recruits and experienced engineers embed new skills and learn new processes, would stretch our operational capability to the limit, potentially creating uncertainty for industry and consumers.

- **Role of the CP:** We welcome Ofcom's comments on the need to involve the wider industry in a shared effort to drive up service standards and we agree that the OTA2 has a key role to play in achieving this. However, despite there being much common ground, the fact is that each commercial entity within the industry will have subtly different motivations and hence we cannot set MSLs at a level that relies upon specific on-time benefits being delivered by CPs (because the MSLs are solely focused on Openreach and hence will not necessarily be CPs' highest priority).

12. Based on the points outlined above, we believe that a Year 3 on-time repair MSL of **90%** (pre MBORC allowance) represents a more reasonable and proportionate, yet still very challenging, MSL. This would also enable us to smooth the **glidepath** towards this MSL value: we propose Year 1: **83%** (80% post MBORC allowance); Year 2: **87%** (84% post MBORC allowance); Year 3: **90%** (87% post MBORC allowance).

13. Even at 90% (pre-MBORC allowance) in Year 3, this is still an extremely challenging on-time repair MSL, and hence the size of the MBORC allowance will be critical. The last 5 years have included a period where the MBORC impact was in excess of 5%, thereby exceeding the current allowance of 3%. While the repair MSLs were sub-80%, the risk associated with this shortfall was acceptable because we were operating sufficiently below the glass ceiling which afforded us the ability to take exceptional measures in response to exceptional events. However, with the significantly increased MSLs now under consideration, we would be unable to accommodate this level of risk. Comments within the Consultation Document suggest that there would be significant resistance from industry to any increase in the MBORC allowance and so if this is not acceptable we propose that considering the increased risk of operating so much closer to the glass ceiling this should instead be mitigated by changes to the process around *High Level MBORC* declarations. Currently, this is capped at 2 GM patches for all events up to a maximum of 8 weeks per event – we propose that these limits are removed.

MSLs should deliver value for money to our customers

14. We firmly believe that in setting service uplift service levels it is vital that the improvements offer value for money to both customers and industry. These decisions should be made with industry, ensuring that the increasing costs of uplifted service performance are debated fully, and that levels are set at a level that is progressive but also offers the right balance between uplift in service performance and the associated cost of delivery.

15. Openreach has carried out extensive and detailed analysis of the relationship between *manpower used* and *service delivered*. This analysis shows that, as the repair MSL approaches the 'glass ceiling', we start to get diminishing returns (in terms of service delivered) for the additional manpower that we commit, as shown in Figure 2 below. The threshold for this is around 90% (pre-MBORC allowance) and we believe that setting MSLs above this will not deliver value for money. The Allocation Model suggests that targeting a level of 93%, rather than 90% in Year 3 increases the cost to support the higher service by £[✂]m across the Charge Control period using the approach adopted by Ofcom. Based on our assessment of the resource and upskilling needed,

the incremental costs of the glidepath proposed by Ofcom to the Openreach glidepath are £[✂]m in Year 2 and £[✂]m in Year 3. The 3% higher on time performance equates to c. 80,000 customers a year and so this equates to an average cost per customer impacted of c. £[✂] and £[✂] respectively[5].

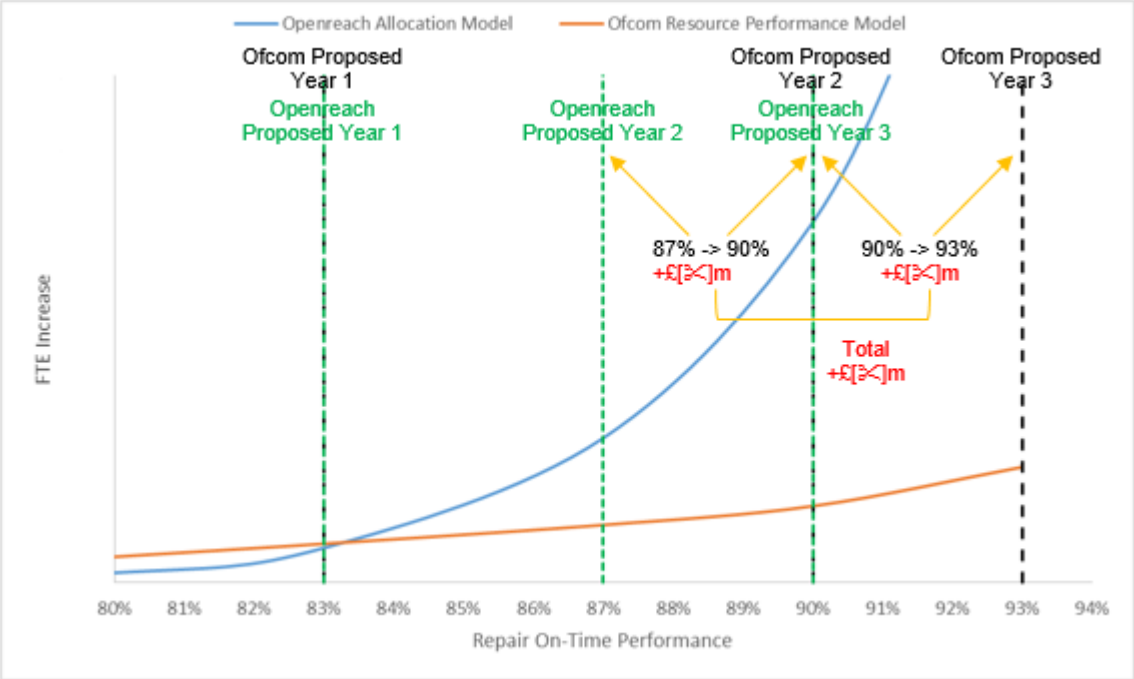


Figure 2: Comparison of cost vs service curve and MSL proposals

The current proposals do not fully fund the investments that we will need to make

16. We agree with Ofcom that meeting the new MSLs will increase our costs and that this should be taken into account within this Charge Control. However, we consider that Ofcom has significantly understated the additional cost that this will drive into our business, and the four main contributing factors for this are summarised below:

- **Volume of fault reductions from our FVR programme have been overstated:** Ofcom's analysis was built around early non-underpinned, aspirational investment scenarios from Openreach. Subsequent learning (leading to a modified investment profile) and the emergence of multiple fault volume headwinds have resulted in a significant reduction in our forecast fault volume savings. The net result of this is that Ofcom understates our required funding by circa **£**[✂]**M** (across the Charge Control period).
- **Key elements of our FVR costs have been omitted from the Charge Control:** Ofcom is proposing that there should be no allowance for the planned FVR spend because it believes that Openreach should have sufficient capex to cover this. However, this assumption fails to reflect four important points: (i) a significant proportion of our FVR spend is opex (circa 35% in 2016/17); (ii) our accelerated FVR investment requires us to take special measures that incur additional costs: e.g. in 2017/18 we will recruit [✂] engineers who will be

[5] Openreach analysis

dedicated to FVR work – the costs of which represent an investment of additional £[✂]M from 2017/18-2020/21 (inclusive) from the 2015/16 base position; (iii) our accelerated FVR investment requires us to operate at a different point on the payback curve and we believe that this means that additional capex cover is justified; and (iv) Ofcom does not recognise that the cost incurred commences before the start of the Charge Control period, and therefore only makes allowances from 2018/19. We welcome the opportunity to work with Ofcom to agree a fair way to fund FVR investments across this Charge Control period.

- **Additional resource needed to deliver service has been understated:** Within the Consultation Document, Ofcom and its consultants provide a reasoned and transparent assessment of the model that they have used to calculate the additional resource needed to deliver the required service uplift. This assessment identifies a number of simplifications made within the analysis (due to time constraints) and acknowledges that these might impact upon the results produced. Openreach commissioned EY to build a simulation tool (the Allocation Model) that could be used to explore the relationship between resource committed and service delivered. This model has been extensively calibrated and closely aligned to the way that our business really works and, as a result, addresses the shortcomings that Ofcom has identified within its own modelling capability. The estimates produced by the Allocation Model suggest that the Ofcom model is understating the additional resource needed to deliver higher levels of service and that the discrepancy can be significant. We are sharing the Allocation Model (and the supporting datasets) with Ofcom and their consultants and, once they are content with its functionality, we propose that this model is used to calculate the additional resource required to deliver uplifted service.

  Additional costs associated with our resource uplift have been omitted: In addition to the understatement of the uplift in resource needed outlined above, Ofcom's modelling does not assume any investment in upskilling is needed as all engineers are able to do everything. In practice this is not the case and, with the career path for new recruits to first learn and embed simple provision and repair activity, this will not be the case. We believe any training costs that are above a business as usual level (applying the base year) should be reflected in the service costing. Finally, there will be an incremental impact of lost capacity whilst engineers are in training or on a learning curve to competence and these costs, to the extent they are above the 15/16 base year, are not reflected in the Ofcom cost modelling. We believe these elements, combined with the underestimate of the resource uplift in the Ofcom modelling, will cost £[✂]m in recruitment and training costs on the glidepath proposed by Ofcom, but reduce to £[✂]m if we apply the recruitment and training assumptions to underpin the glidepath to 90% in Year 3 that Openreach is proposing (this is covered in more detail in our response to Question 8.2). Both of these cost scenarios are significantly higher than the c. £30m for which we believe Ofcom's model allows.

The MSLs must be proportionate and consistent with other measures

17. We encourage Ofcom to work closely with us to ensure that the MSLs are objectively justified, proportionate, impose the appropriate level of regulatory obligation and consistent with other measures.

18. MSLs should be set by Ofcom with its statutory duties in mind, including promoting efficient investment and innovation[6], taking appropriate account of the risk incurred by Openreach[7] and ensuring that it does not impose or maintain burdens which have become unnecessary[8]. Remedies imposed must be objectively justified and proportionate to what the condition is intended to achieve[9]. This requires careful consideration on an ongoing basis and, in particular when SMP conditions are being re-imposed or introduced, of the necessity of each particular condition.

19. In this respect, we refer to the evidence above on the achievability of the 93% Year 3 repair on time MSL, the large step change between Year 1 and Year 2 (increase of 7%), and that the MBORC allowance might leave Openreach unjustifiably financially exposed. In order to ensure that the remedy is proportionate, the MSLs should be amended to reflect these issues. This is particularly so given that failure to meet the MSLs can have significant repercussions, including the imposition of fines.

20. Ofcom should also look at the inter-relationship between the MSLs and SLAs/SLGs, for example:

    - **Removal of the 60-day SLG compensation cap:** Openreach does not agree with the proposed removal of the 60-day SLG compensation cap. It is normal commercial practice to include a cap on compensation payments in any SLA contained within a commercial contract so that liability is not open ended or unlimited.

    - **Introduction of an "SLA+5 working days Repair Tails MSL":** Openreach does not believe that it is appropriate for Ofcom to introduce further MSLs to cover repair tails. This is an area where: (i) Openreach has demonstrated real commitment and focus; (ii) Performance is strong – and continuing to improve; and (iii) there is already sufficient financial incentive (via SLG payments) to ensure that Openreach will maintain its performance. Accordingly, the introduction of a "SLA+5 working days Repair Tails MSL" is an unnecessary and a disproportionate regulatory burden to impose.

21. In summary, we genuinely believe that the quality of service measures as proposed by Ofcom when adjusted to reflect our points made above, will continue to deliver real benefits to customers and industry alike, consistent with Ofcom's legal duties. Openreach cannot achieve this alone and we therefore look forward to working together with Ofcom and industry to take forward the debate to enable an achievable, affordable and proportionate service regime[10].

[6] The Communications Act 2003 (the Act), sections 3(4)(d) and 4(8)(aa).
[7] Framework directive, Article 8(4)(d).
[8] The Act, section 6(1).
[9] The Act section 47
[10] In this regard, we also refer to Section 3 of our response to WLA Consultation Volume 1 where we set out in detail concerns about the Consultation process, which also apply specifically to this Consultation.

2. Overview: Ensuring the right outcome for Consumers and Industry

22. Within the relevant sections of this response, we provide answers to the specific questions posed by Ofcom and summarise the evidence that supports our arguments. However, to ensure that the links between these individual answers are fully explained, and that the context surrounding these individual points is apparent, we also summarise the key points of this response below. In order to make it easier to identify the links between related points, this section uses the same structure as the Executive Summary but with the addition of a small number of sub-headings to add clarity.

(i) Introduction

23. **Openreach is fully committed to improving the service that we deliver to industry.** We know that the connectivity services that we provide to homes and businesses are critical to the UK economy. We believe that we are pivotal to providing a continued progressive approach to enhancing quality of service for the industry, our CPs and customers. We are fully committed to rising to this challenge.

24. **We should achieve service uplift: provide choice; equivalence; and value for money.** We believe service uplift MSLs should be stretching but importantly that they should also be fully funded and achievable. We also believe that we should make decisions with industry on what level of service we are seeking to ensure that they offer the right level of consumer benefit and value for money.

25. **We agree with Ofcom that all of industry has a role to play in driving up the standard of the service that it delivers to customers, and we believe that CPs need to be further incentivised and focused on their role to deliver service uplift.** We welcome Ofcom's approach to look at auto-compensation and their approach to encourage CPs to improve service by publishing more transparent customer service performance metrics but we do not believe these will go far enough to provide a meaningful service improvement in the short to medium term. We believe that the industry as a whole – and customers in particular – would benefit from the generation of end-to-end metrics that accurately summarise the experiences of our customers. Considering that an estimated 2/3rds of all customer service impacting events are entirely within the home/CP domain, we do not believe that the importance of these events in defining the actual customer experience is adequately considered today. On average, a customer will have a network fault every 9 years (i.e. a fault every ~3000 days; it is working >99.9%[11] of the time) – and so the other problems being experienced by customers are caused by factors beyond the Openreach network. We also believe that any end-to-end measure of customer issues will show contrasting trends: In the Openreach network domain, our sustained investments have addressed recent trends and have halted year-on-year fault rate increases, whereas we believe that elsewhere within the home domain we will see a worsening trend (driven in part by the year-on-year increases in the number of connected devices in the home[12]).

26. **We believe that we should also look at what *minimum standards* we would expect CPs to**

[11] Service Delivery Insight analysis of RD3 data
[12] Real Business, April 2016

comply with in discharging how a product is sold and serviced. We believe that a much tighter interface between CPs and Openreach is necessary to support an uplift in service performance. Currently, many CPs are failing to adequately embrace the level of technical and service based investment that Openreach is making (in consultation with industry). An example of this is that, 6 years after the launch of *at-scale* fibre diagnostics, many CPs are not consuming our 'Brandenburg' based algorithms that help them understand how their NGA superfast broadband services are performing in-life. This means that, as they scale *self-install* engineering activation of these services, they often fail to notice that the service that they have provided is degraded from their service expectation and, as a result, customer experience suffers. If these CPs consumed the Brandenburg diagnostic services they would be able to identify that circa 20% of their NGA customer base needed further work to be carried out in the home domain to uplift their internal wiring to allow customers to get the most from the product that they have bought. As such, we would like to propose a set of CP minimum standards that need to be complied with, thereby delivering greater assurance of improving the actual customer experience delivered. We would welcome the opportunity to work with industry, CPs and OTA2 to define these *minimum service standards* for key voice, broadband, superfast and ultrafast services to ensure that product launch, service activation and in-life experience are collectively enhanced for customers. If Ofcom's prime goal is to improve the service experienced by customers, such measures will ensure CPs have sufficient focus upon their core broadband and connectivity services.

27. **Openreach has worked hard to deliver service and efficiency over time and already offers excellent value for money and low rental prices (compared to international benchmarks**)[13]: Openreach offers wholesale line access services at lower prices than are available in any other major European country. This has resulted in the UK having the largest margin taken by CPs of any European country (with the sole exception of Lithuania), and this is another reason why we believe that improving customer service is a challenge that the whole of our industry needs to meet (rather than this being solely an Openreach issue).

28. **We do not regard the MSLs targets as a "*ceiling*".** We have consistently outperformed against MSLs and will continue to challenge ourselves to do so. In 2016/17 we out-performed our First Available Date (FAD) MSLs by more than 10% and our provision on-time MSLs by more than 4% (both expressed at a national average). Our commitment to out-performing the repair MSLs was also clear at both a national and regional level: (i) We exceeded our national MSLs for SML1 and SML2 by 8.1% and 3.7% respectively (ii) In our best performing patch (London), we exceeded the MSLs for SML1 and SML2 by 11.7% and 7% respectively[14]. If we were treating MSLs as a *ceiling* (as Ofcom implies), we would have reduced our service performance to reduce cost. We have consistently over delivered on all metrics since their inception, thereby demonstrating that we have consistently viewed the Ofcom MSLs as a floor of service that we exceed, rather than the maximum we need to deliver. However, to deliver the historic level of service uplift has required a substantial level of recruitment and changes to our operational processes, which has been challenging but we have learned from this and continue to learn and anticipate that we can continue to drive service improvement into the next WLA market review period.

13 Cullen international: "Wholesale line rental - Regulation and prices"; CTTEEU20170041 - April 1, 2017 - Janne Kalliala
14 647 MSL report archive

29. **We are performing at levels of on-time repair that exceed the performance delivered in 2009/10 (on a like-for-like basis) and it is important this is recognised and noted[15].** At the start of 2009/10, the industry was using a different set of SMLs, including one which allowed a "working day + 3" clear for the *Standard* SML. If we take the period of 2009/10 for which we have reliable detailed records (Q4) and compare with the same period in 2016/17, we can see that – for the comparable products that had significant volumes in both periods (SML1 vs. Standard Care) – the performance delivered in 2016/17 is circa 2% above that delivered in 2009/10. This is achieved despite the fact that (i) Q4 2009/10 had lower rainfall, wind speed and humidity than the equivalent period in 2016/17 and (ii) the on-time regime in 2009/10 was more forgiving, enabling us to treat faults received outside working hours as if they were part of the following day's intake.

30. **We recognise the importance of continuing to invest in our network assets through Fault Volume Reduction (FVR) to drive down the network fault rate and hence reduce the level of disruption that all customers receive[16].** We have stepped up our investment in our FVR plans and will continue to develop plans to reduce total cost of ownership by uplifting and treating problem areas of the network. We have increased our FVR spend significantly (e.g. 2016/17 spend was double 2015/16 spend) and, as a result, we have now halted the rise in network fault rate (c.f. the 5% to 6% year-on-year increase that provided the backdrop to the previous FAMR). Our plans to invest ~£[✂]m over 5 years (commencing with the 2016/17 investment) will lead to a significant reduction of network fault rate – we forecast that by 2020/21 we will have driven it down to [✂]% of the 2015/16 level. We believe that these investments are in the best interests of customers, CPs and Openreach. We assert that these should be fully funded and supported whether delivered through capex or opex spend (we do not feel the accounting treatment used is a reliable indicator of benefit derived, with ~35% of FVR investment being accounted for as opex). However, we do not agree that the network fault rate forecasts set out by Ofcom (circa [✂]% of 2015/16 levels by 2020/21) are achievable, given the significant uplift in service levels that also need to be delivered (through significant levels of recruitment and upskilling) and the fault rate headwinds that we face (see paragraph 31 below). We have committed to continue the step up in network investment and hence we are recruiting [✂] engineers specifically for FVR to help ease some of the resource contention that we have seen. The costs for these new recruits have not been captured in the service cost uplift calculated and represent an additional investment of £[✂]M from 2017/18 to 2020/21 inclusive (from the 2015/16 base position).

31. **Despite our FVR investments, we face significant headwinds in terms of the fault volumes that we are facing and we need to work with industry on how to adequately mitigate these.** Multiple emerging trends are combining to reduce the net impact of our efforts to improve network health. Examples of this include the impact of increased customer usage, more demanding applications, increased levels of intervention within our network (driven by the move to NGA) and the impact of CPs relying almost exclusively on self-install provision journeys for NGA (which prevent us from identifying in-house wiring issues at the time of the provision activity and completing the provision activity with an end-to-end test). Some of these headwinds can only be addressed with the full support of CPs and it is therefore essential that improving customers' experience is treated as a team game, with the associated requirements being appropriately distributed across the multiple layers that exist within our industry. In our answer to question 4.2, we propose a fault

[15] Service Deliver Insight analysis of RD3 data
[16] See our responses to questions 4.1 and 4.2 for full details of sources and references

volume forecast that better reflects these headwinds, and we propose that Ofcom updates its analysis to utilise this important new information as the most appropriate basis for future resourcing estimates. Openreach's forecast for network fault rate ([✂]% of 2015/16 levels by 2020/21) is higher than Ofcom's view ([✂]% of 2015/16 levels by 2020/21) and we believe that this difference is responsible for a c. **£**[✂]**M delta** between our assessments of the financial positions resulting from this charge control.

32. **Alongside FVR we are working to build an increased quality consciousness and culture in our workforce with all engineers and managers focused on improving its quality of workmanship**. As part of our commitment to improve the health of our network (reflecting the demands of Ofcom, CPs and our own engineers), we have taken significant steps to drive up our quality of workmanship. Our engineers are now taking more time to get it right first time more often, committing more effort to critical quality-enhancing activities (e.g. comprehensive test-on-completion). This is one example of the trade-offs in service and cost where engineers are spending more time on jobs to help increase quality and thereby help to lower our network fault repeat rate.

33. **We understand the need for us to continue to provide open and transparent access to data and key KPIs and endorse the reporting requirements and KPI publishing outlined in the consultation (with a small number of proposed amendments).** However, as mentioned above, in order to ensure that the industry collectively focuses on the issues that really make a difference to customers, we would like to work with CPs and the OTA2 to produce a set of meaningful end-to-end service KPIs.

(ii) MSLs should be achievable

a. General comments on MSL achievability

34. **We have engaged consultants to develop a comprehensive and powerful model that enables us to better understand the link between resources employed and service delivered, and we have carried out extensive analysis with this to show the true uplift in resources needed to deliver on-time service.** Ofcom uses a model from Analysys Mason (the "Resource Performance Model") to calculate the additional resource required to deliver the specified levels of service. Analysys Mason openly admits that, due to time constraints, they had to make several significant simplifications in their modelling. In our detailed response below, we outline the model that EY has developed on behalf of Openreach (referred to as the "Allocation Model") - this addresses all of the limitations of the Resource Performance Model (as identified by Analysys Mason) and, as a result, delivers a much more accurate estimate of the additional resource requirements. The Allocation Model is more accurate and flexible than the more basic Distribution Model that we used as part of our FAMR submission and is also more reflective of the Openreach operational dynamics than the more simplistic Resource Performance Model. We have shared the Allocation Model, and the detailed datasets that underpin it, with Ofcom and its auditors and we are continuing to work with them to help them review and understand the significant investment that we have made in this capability. Having carried out extensive and comprehensive calibration of the EY model, we are now confident in its accuracy.

35. **Recruitment and upskilling timescales and costs are significant and also produce task time headwinds that offset our ability to deliver efficiency**. We ask our engineers to do a difficult job, locating and fixing faults against the backdrop of increasingly complex services being delivered over ever-more diverse technologies. We have to (i) take increasing care around who we recruit and

where we recruit them (ii) spend an increasing amount of time on training/buddying to ensure that they acquire the necessary skills (e.g. for basic repair skills, time-to-competence is ~ 11 months) and (iii) invest significantly in the tools and equipment that they will need to fulfil this increasingly challenging role. Consequently, it takes considerable time, effort and money to expand our workforce.

36. **Openreach is not prepared to sacrifice the service we deliver to some customers to artificially improve our performance against MSLs.** It might be mathematically correct that we could achieve higher MSLs (for a given amount of resource) by sacrificing the most challenging geographies and products and focusing all of our efforts on achieving exceptional performance in the most accommodating areas. However, we do not believe that this is an acceptable approach, and in our detailed answer to Ofcom's questions we instead propose national MSL targets that can accommodate the geographical variations across our operation. We do believe, however, that this is an area where we need further engagement with CPs and Ofcom to ensure our assumptions are correct.

b. Repair MSL achievability[17]

37. **We welcome the Ofcom service levels for on-time repair and the increase from the current levels of 80% (77% post MBORC allowance) towards 93% (90% post MBORC allowance).** We do however believe there are significant discussions to have with Ofcom and industry to ensure the right outcomes are actually achieved from this. This involves discussing whether the levels deliver value for money, whether they are achievable, whether the proposed glidepath can be underpinned operationally and how we make these decisions across industry. Our belief (justified in detail below) is that a Year 3 repair MSL level of **90% (87% post MBORC allowance)** is more appropriate, from both an achievability and a value for money perspective.

38. **Ofcom's repair MSL glidepath requires a 7% point step-up from Year 1 to Year 2. We propose a smoother MSL glidepath that will take us towards the Year 3 service level in a way that is achievable and will deliver value for money to industry and consumers.** In our detailed answer to question 5.4, we propose an alternative repair MSL glidepath that takes us to the service level end-point without the need for a steep step from any one year to the next. This is important because any sudden step-up in required performance will require a matching increase in resources, and the recruitment and skilling needed to support this will be very difficult to achieve and we do not believe it delivers value for money. In summary, we propose Year 1: **83%** (80% post MBORC allowance); Year 2: **87%** (84% post MBORC allowance); Year 3: **90%** (87% post MBORC allowance).

39. **The lack of sufficient geographical detail in Ofcom's analysis results in it setting repair MSLs that are too high to be achieved across ALL of the GM patches:** In our previous FAMR response, we highlighted the factors that vary from patch to patch and that should be considered when setting a minimum service level that has to be met in every region. We do not believe that Ofcom has adopted this approach in this latest consultation and the modelling does not appear to reflect the true nature of the volume changes from patch to patch (across both repair and provision). If MSLs are to be increased significantly beyond the current levels, it is essential that these minimum standards reflect the performance deliverable in the most challenging GM patch.

[17] See our responses to questions 5.1 to 5.8 for full details of sources and references

40. **The proposed significant increase to the repair service levels means that we no longer have the contingency to absorb the flaws within the current definition of on-time success.** The following three issues have a particularly high impact:

    (a) Contrary to Ofcom's statement in section 5.42 of its "Quality of Service Remedies" document, Openreach is not always given an exemption from on-time failure when we are unable to gain access to a premises. Without industry-wide agreement that we should appoint a significantly increased number of faults, we would need to be granted an exemption for on-time success on these faults.

    (b) The current clear reject process is not compatible with the proposed service levels and hence we need significant changes to be made here (e.g. we would need the "clock" to restart every time that there is a clear reject).

    (c) Regardless of how late we receive an SML2 fault report from a CP (e.g. 11.59 pm), we are required to complete the repair the next day. As part of our previous FAMR response, we recommended that a 6 pm cut-off was implemented (in line with the majority of other European countries that reflect time-of-day in their fault reporting restrictions and SML definition). This becomes ever more important if we are to deliver SML2 at service levels approaching those currently being proposed within the Consultation Document (as our opportunity to deliver service effectively on late arriving faults is significantly reduced).

    Openreach therefore proposes that the on-time measure should be changed to address these issues.

41. **Ofcom's assessment of the factors impacting the glass ceiling for our repair service performance is incorrect and it is important that we align these so that we can plan with confidence and focus together on the changes we can make for the good of the customer.** Ofcom's discussion of the glass ceiling that impacts on-time repair appears to include a misunderstanding around how the measure is currently defined and this is used to discount one quarter of the unavoidable failure. Specifically, Ofcom claims that "No Access" does not count as an on-time failure. However, this is not the case – for an MPF[18] repair activity that is initially unappointed (which accounts for circa 80% of non-chargeable work), should we subsequently find that we need access then we can only claim an on-time success if we can appoint and complete the job within the original timescales[19]. This misunderstanding results in Ofcom removing 2.1% points from the glass ceiling, leading to its proposed value of 96.6% (which was subsequently a key part of their argument for justifying a 2020/21 MSL of 93%). We expect that Ofcom will flow this correction through to all of its MSL calculations, decreasing all of the targets accordingly (before taking into account the other necessary corrections highlighted in preceding paragraphs) or that it will grant on-time exemptions for these faults (as proposed above). Extensive analysis of the factors contributing to the glass ceiling has shown that – to reach the performance levels proposed by Ofcom – we

[18] For WLR, the rules are more reasonable – here, provided that we have contacted the CP to set up an appointment by 1pm of the following day, we are not deemed to have failed against the on-time measure.

[19] In 2016/17, we attempted to address this issue and, with the support of OTA2, proposed to appoint more of the borderline cases where we believed there was a ~50% probability of access being required. Despite the fact that we are able to demonstrate that our proposals would deliver a significant increase in on-time repair performance, it was strongly opposed by CPs – without a single one accepting our offer to trial this service enhancement.

would have to make multiple significant steps, such as re-examining the attendance patterns of our entire engineering workforce (which may take us well beyond our current union resourcing agreements). We would welcome the opportunity to engage in further discussion, with Ofcom and industry, on opportunities to address the factors that may define the performance ceiling and how this impacts the proposed service levels across all geographies.

42. **Openreach has developed a revised repair glass ceiling which gives a more complete and accurate view of the constraints in delivering repair service levels than presented previously.** This demonstrates that the glass ceiling is effectively lower than that previously presented by Openreach and the derived view presented by Ofcom, although Openreach recognises that some components are partially addressable. As such, we forecast a glass ceiling of 92.2% (nationally) for Year 3. This contrasts sharply with Ofcom's proposed value (96.6%).

43. **Ofcom's analysis of the repair glass ceiling does not reflect geographical variations.** The factors that define the glass ceiling for on-time repair vary from geography to geography. As the MSLs have to be achieved in every region, the glass ceiling should be derived from performance in the most challenging area. This would lower the glass ceiling by a further 0.7-1.5% to more accurately reflect operational reality. It is not appropriate to assume that such variations could be catered for by the High Level MBORC declarations – by definition, these measures need to be available to allow us to cope with exceptional events, anywhere in the country.

44. **Openreach's forecast maximum glass ceiling in Year 3 of 92.2% nationally, and 90.9% in the worst GM region, demonstrates that the 90% level (93% pre MBORC allowance) is a maximum not minimum service level.** Even if the measure corrections outlined above are implemented, Ofcom's proposed Year 3 MSL is set at a level that is so close to the glass ceiling that the level of associated risk would be unacceptable.

45. **The treatment of the on-time repair glass ceiling in Ofcom's Resource Performance Model is not appropriate.** The document that provides further details of the Resource Performance Model[20] states that "*it was necessary to reduce the proportion of repair minor fails from 5% to 3% such that the target of 93% repair performance was possible to achieve*". It can be very misleading to change key facts because you cannot otherwise get the answer that you were seeking (this somewhat negates the point of the modelling). In reality, this confirms that the stated target is probably not achievable and that, if executed with the original numbers, Ofcom's own modelling would have confirmed this. We therefore propose that results based on scenarios where the input data has been modified in this way should be separated from factual scenarios and treated very differently.

46. **Ofcom's approach regarding different repair Service Maintenance Levels (SMLs) is overly simplistic.** Ofcom's analysis appears to assume that the incremental service cost of moving from SML1 to SML2 can be calculated by modelling simple national scenarios and then interpolating between them. This is a very significant over-simplification – the genuine cost impact of any movement in SML/product is, in fact, a complex function of geography, product mix, SML mix and resourcing levels – and hence any attempt to simplify the dynamics of the market in this way will result in unreliable results. We therefore recommend that Ofcom takes a more appropriate approach to modelling SMLs.

47. **We agree with Ofcom's proposal to continue to make an allowance for MBORC. We believe**

[20] "WLR/LLU Charge Control 2017", 9th March 2017, Ref: 2008936-102b

that a higher MBORC allowance would be more appropriate given historic data, which suggest that in particular years MBORCs can be as high as 5%. However, if this is not acceptable to Ofcom, at the very least, we believe that we need more flexibility around exemptions for high level events. Specifically, the current limitation on High Level MBORC declarations should be removed: i.e. this should no longer be constrained to just two GM patches, with additional declarations being considered on a case-by-case basis, overseen by Ofcom to ensure that industry has confidence in the process.

48. **Extreme care is needed when individual strands of the UK telecommunications market are analysed in isolation.** The Consultation Document appears to attempt to isolate two specific product/SML combinations and assume that their repair MSLs and implementation costs can be analysed without taking the other aspects of our business into consideration. We have a single workforce that has to deliver against all of our objectives and commitments for repair, provision and FVR – analysing a single strand of this in isolation neglects many of the key dynamics that dictate the performance of our organisation. We propose that Ofcom makes decisions based upon the entirety of the market.

49. **Openreach needs to dimension its business appropriately and cannot assume that repair products offered for better service will not be taken up further in the future.** Separating MPF SML1 from the rest of the market and assuming that this can be considered in isolation is a significant over-simplification of the way that our business operates. With the challenges we face around recruitment and our time to competency lead times, we simply cannot uplift our available resources overnight. However, CPs can change their SML policies very rapidly – for example, in 2016/17 we had to change the SML for 17.1 million lines with minimal notice. Consequently, we cannot take the risk that we could build our resourcing model around one specific mix of SMLs. Given the importance that Ofcom ascribes to service within this consultation, the logical conclusion is that – at some point within this Charge Control – we should expect CPs to move more customers to SML2. Given that we cannot recruit, upskill and buddy engineers within the likely timescales of any such decision, our only option is to build sufficient resource to be able to meet the imposed MSLs in an SML2-rich market. In this way, we will incur many of the costs of SML2 whilst only getting the revenue for SML1. We therefore propose that Ofcom sets MSLs that could be achieved in an SML2-rich market (as is appropriate for a minimum service level) – we provide detailed recommendations around this in our answer to question 5.3. To support this (and to ensure that we do not have to dimension our resource to cater for 100% SML2) we also propose that Ofcom supports the introduction of a 6 month lead time for high volume bulk migrations of SML, thereby ensuring that we have sufficient time to react to these significant changes.

<u>c. Installation MSL achievability</u>

50. **We welcome the increasing service levels for installations outlined in the Consultation Document.** This is an area where we have significantly out-performed the MSLs. We believe, however, that achieving the proposed increased service levels will require a further level of CP collaboration and co-work to achieve (and indeed surpass) the desired uplift. We believe that we need to relook at CP forecasting accuracy to help us resource and estimate our plans. Whilst we have had some success with national forecasting accuracy, regional success on copper is still only at 34% and fibre forecasting, which the new regime will also extend to, is at only 4%. Openreach's operational teams are then expected to absorb the unforecasted demand and still meet MSLs in every region and for every year. Openreach has no control over the demand for provision that it

experiences: a typical business would adjust prices to regulate demand but we do not have this option due to regulatory pricing constraints under which we operate. We believe that it is not reasonable to compel Openreach to deliver high QoS standards against a demand which we have no way of influencing. Whilst the SLG regime requires CPs to provide reasonably accurate forecasts for provision demand (and gives Openreach some degree of protection when this is not the case), there is no such safeguard within Ofcom's current MSL proposals. We propose that, as a minimum, Ofcom should re-use the current SLG forecast safeguards to trigger exemptions for provision MSLs (i.e. any provision QoS failures that are associated with out-of-limits forecasts would be excluded from the formal assessment of our performance against MSLs).

51. **We believe that if Ofcom's main desire is to increase speed of installation then as an industry we should relook at switching rules and the rules around what type of installation is offered and how it is selected**. We believe that in a number of cases as an industry we collectively waste Openreach resource choosing installation products that are not needed and in other cases, where an engineering visit would be more desirable, CPs opt for a cheaper self-install option when a customer could benefit from an initial visit.

52. **We are supportive of shorter lead times for both copper and fibre orders to enable greater choice for customers.** However, Ofcom need to be aware shorter FAD will not automatically deliver a shorter average time to install (ATTI). In fact there is a very low statistical correlation (R squared value 0.006)[21]. We can see 29% of installations are prevented from being offered inside 10 days (due to e.g. cooling off periods) and with 22% of the remaining customers also choosing to take days 3 days or more after the FAD. In addition CP CPE supply lead times will also impact on ATTI.

(iii) MSLs should deliver value for money to our customers

53. **We are committed to increasing service levels and believe that it is vital that MSLs are set at a stretching but achievable level. We also believe that they need to be fully funded and offer good value for money**. As an industry we need to reflect on whether we will achieve the goal of delivering a quicker time to resolution for our customers solely by relying on Openreach to uplift the service associated with each SML/product or whether we need to do something else to help ensure CPs offer customers a more progressive service offering.

54. **To be able to achieve the proposed uplifted repair MSLs, Openreach will need to continue to recruit extensively and undertake high volumes of multi-skilling training, thereby driving significant additional costs[22].** Openreach's ability to meet the rising demands and expectations of the industry are built upon our plans to recruit and upskill at scale. We propose that Ofcom's estimates of the resources (and associated costs) required to meet MSLs are updated to include a fair share of recruitment, upskilling and buddying costs. We believe the single year increase in recruitment and training to achieve the Year 2 service level of 90% represents a significant risk to service delivery. We also believe that, based on the current industry wide practices (e.g. the clear reject process) and metric measurement, 93% reflects an aspirational target in Year 3 rather than a MSL. The Allocation Model suggests that beyond an uplift of 47% to resource we see very limited incremental uplift to service levels. However this would require almost [✂] engineers to be recruited over the next two financial years at c. [✂] a year, alongside upskilling of a further

[21] Openreach 445 report, data correlation of Copper FAD to appt ATTI from April 2014 to June 2017,
[22] See our responses to questions 8.1 and 8.2 for details of references, sources and approach.

c. [✂] engineers. This would be the most ambitious single year training and recruitment plan that Openreach has ever undertaken and carries significant cost and risk, which we do not believe has been reflected in the Ofcom service modelling. In summary we therefore believe that the proposed glidepath carries too much risk to customer service from Years 1 to 2 and the Year 3 service level is unachievable in all regions in the current structures of the MSL regime.

55. We believe that the repair MSLs proposed for the final year are unachievable and do not represent value for money. Considering the numerous issues highlighted throughout this response, Openreach asserts that the proposed MSLs for 2020/21 are unrealistic and that attempting to achieve them would drive a disproportionate level of cost into our operation and into the industry. The research quoted by Ofcom indicates that customers are not seeking reduced time-to-repair at any cost: 1% of residential customers cited '*responsiveness to faults*' as a key factor in choosing a service/CP versus 62% citing '*price*'[23]. There is therefore questionable justification for setting MSLs at a level that is well beyond the point where we are delivering value for money for the incremental on-time repair improvements. In our response to question 5.3 below, we recommend that a **90% (87% post MBORC allowance)** is a more appropriate level for the MSL, and we provide a detailed justification of our arguments for this.

56. The proposed glidepath towards higher repair service levels is too rapid to enable value for money to be delivered. Table 5.8 in the Consultation Document specifies the year-on-year changes in the repair MSLs. Given that we need to recruit extensively and that our FVR plans will not deliver fault volume reductions in line with Ofcom's expectations, Openreach strongly asserts that the step-change from 2018/19 to 2019/20 is unlikely to be achievable in a cost-effective manner. Given the transformation that we will need to execute across our resourcing, scheduling, quality and engineering to deliver service at the unprecedented levels being proposed within the Consultation Document, in any given year the year-on-year change in repair MSL should be limited to 3% or 4%. Consequently, as outlined above, we propose that the following glidepath would be more appropriate: Year 1: **83%** (80% post MBORC allowance); Year 2: **87%** (84% post MBORC allowance); Year 3: **90%** (87% post MBORC allowance).

(iv) The current proposals do not fully fund the investments that we will need to make

a. General comments on funding

57. There is an inherent trade-off between efficiency/cost and service/quality which is not acknowledged within the Consultation Document. The Consultation Document, and the CPI-X calculations that accompany it, could be interpreted as implying that there is no interaction between service, quality and efficiency. In reality, there is an unavoidable trade-off between efficiency/cost and service/quality and this should be factored into future projections. In our response to Question 4.2 below, we show how our operational decisions and processes are built around a complex series of trade-offs, requiring us to find the right balance between all of the competing drivers. We propose that Ofcom uses our actual measured experience of the trade-off between efficiency and service in 2016/17 as the benchmark for future trends around these two critical factors. In 2016/17, we doubled our FVR spend and managed to exceed the increased MSLs imposed by Ofcom. However, the **6%** increase in repair on-time success that we delivered came at a cost – we had to

[23] Figure 3.2: Jigsaw survey

expend **11%** more resource to achieve it[24].

58. We will continue to deliver efficiency but at a lower level than the assumed 5.5% (opex) and 3% (capex) annual efficiency rate. Our efficiency plans are evolving from being task time and utilisation focused to being more volume related (i.e. removing unnecessary/low value tasks altogether, thereby lowering the total cost of ownership delivered in the medium term). This is because the delivery of efficiency gains is now challenged by five key factors: (i) with so many new recruits and with the field workforce requiring extensive multi-skilling, there is an inherent skilling and recruitment drag in the workforce; (ii) many of our innovative planning and tools technology deliveries have now been completed and the benefits fully realised; (iii) the workforce benefits received from higher level of utilisation and allocation efficiency are being offset by the need to dispatch to deliver service; (iv) many initiatives have now reached a ceiling in their delivery - with a workforce that is over 99.3%[25] utilised in a working day; and (v) there are also some headwinds as we attempt to increase our quality delivered which will drag historic task time efficiency (e.g. improved testing). As a result of these factors, we expect that the majority of our transformation benefits in 2017/18 will be realised as volume efficiencies, with FVR dominating the repair savings and visit automation dominating provision. It is clear, therefore that Ofcom's approach of accounting for efficiency improvements as entirely separate from FVR risks double counting the benefits delivered (unless the efficiency gain forecasts are reduced appropriately) thereby significantly under-estimating the resource that Openreach will require to deliver a certain level of service. In our response to the Consultation[26] Document, we provide extensive analysis of this issue.

b. Funding for Fault Volume Reduction (FVR)

59. **Ofcom's assertion that Openreach's increasing opex spend indicates a lack of FVR spend is flawed**: A significant element of FVR spend has to be treated as opex (e.g. 35%[27] of our 2016/17 spend). Therefore, the act of executing FVR may actually drive up opex in the short term, with benefits being experienced in the medium/long term. It should also be noted that the more we invest in FVR, the greater the proportion of our spend that will be opex (as the activities we carry out to identify where FVR is required are all opex and these will increase as we push our FVR investment beyond the point where our engineers and fault-rate monitoring enable us to find a sufficient number of suitable targets).

60. **Key elements of our FVR costs have been omitted from the Charge Control[28].** Ofcom's current proposals state that there should be no allowance for the planned FVR spend because they believe that Openreach should have sufficient capex to cover this. However, this does to reflect four important points: (i) a significant proportion of our FVR spend is opex (ii) our accelerated FVR investment requires us to take special measures that incur additional costs: e.g. in 2017/18 we will recruit [✂] engineers who will be dedicated to FVR work – the costs for these new recruits represent an investment of £[✂]M from 2017/18 to 2020/21 inclusive from the 2015/16 base position (iii) our accelerated FVR investment means that payback takes longer as the marginal benefit reduces and therefore additional capex cover is justified and (iv) Ofcom does not recognise

24 Resource Dynamics analysis of Openreach Geo Tracker data
25 Source 15/16 MUR - *In 15/16, shows no work was available for engineers 0.7% of the time (95.3% working, 4% training, personal or vehicle safety and other misc time)*
26 Openreach's response to Ofcom's 'Volume 2 Wholesale Local Access Market Review' Consultation
27 ORBIT finance and compensation dashboard
28 See our responses to questions 4.1 and 4.2 for full details of references and sources

that the cost incurred commences before the start of the Charge Control period, but only makes allowances from 2018/19. We would welcome the opportunity to work with Ofcom to agree a fair way to fund FVR investments across this Charge Control period.

c. Funding for uplifting repair Quality of Service (QoS)

61. **Ofcom's analysis significantly understates the resource required to deliver higher levels of repair service.** Using the detailed, comprehensive and accurate Allocation Model developed by EY, Openreach has analysed numerous different scenarios, and we are confident that we can demonstrate that Ofcom has significantly under-estimated the level of additional resource required to enable Openreach to meet the MSLs proposed by Ofcom. We propose that Ofcom update its analysis to reflect the in-depth insight that is delivered by the Allocation Model.

62. **When we accurately model the resources required to deliver uplifted service and consider all of the costs associated with this, we can see that the investment required to deliver on-time repair at levels beyond 90% becomes significant**. To move from a 2015/16 base to Year 2 desired service levels of 90% (87% post MBORC allowance) would require an incremental resource investment of 25%. However, to move from the 2015/16 base to a Year 3 desired service level of 93% (90% post MBORC allowance) would require over 47% increase in resource.

63. **To be able to hit the uplifted service levels Openreach will need to continue to recruit extensively and undertake significant multi-skilling training of our engineers to meet the service levels.** Openreach's ability to meet the rising demands and expectations of the industry are built upon our plans to recruit and upskill at scale. We propose that Ofcom's estimates of the resources (and associated costs) required to meet MSLs are updated to include a fair share of recruitment, upskilling and buddying costs. Putting to one side the incremental investments we have made in 2016/17 and 2017/18, the costs of recruitment and upskilling needed across the Charge Control period to achieve the proposed Ofcom glidepath to 93% are £[✂]m, compared to the current allowance in the Ofcom modelling of £30m (£[✂]m under-funded). These costs reduce to £[✂]m based on the proposed Openreach glidepath to 90% in Year 3 (compared to Ofcom modelling of £30m). This suggests that the cost to deliver on time to the incremental 3% (c. 80,000 customers a year) equates to £[✂] per customer in Year 2 and £[✂] in Year 3 of the Charge Control period. Whilst Openreach believes we should aim to deliver on time to as many customers as possible, we do not believe this represents value for money to industry or consumers.

64. **Ofcom's assumptions around our ability to deliver significant efficiency improvements in parallel with raising our glass ceiling are unrealistic.** Ofcom is proposing aggressive opex efficiency improvement assumptions of 5.5% year-on-year. In reality, the majority of our efficiency gains are generated from avoiding unnecessary volume, and a key part of this is eliminating any avoidable failure that reduces the likelihood that we will achieve on-the-day success (thereby potentially raising the glass ceiling). Therefore, we propose that any assumed glass ceiling improvements are "netted off" Ofcom's efficiency targets (because these will effectively be part of any efficiency gains that we deliver).

(v) The MSLs must be proportionate in compliance with Ofcom's legal duties and consistent with other measures

65. **Ofcom's assertion that the best way to get Openreach to invest in FVR is to increase repair MSLs is counterintuitive and potentially damaging to the industry as a whole.** Resource

contention could mean that Ofcom's proposals to significantly ramp-up repair MSLs will achieve precisely the opposite result to that which it is targeting. Every percent that is added to the MSLs in the early years (while we are still building up our pool of appropriately skilled resource) will reduce our ability to execute FVR because it will require us to divert resource from FVR to our customer facing queues where they can help to bolster our day-to-day repair performance. FVR is a long term solution to a long term issue (underlying network health) – even though we are extremely passionate about FVR (hence why we doubled FVR spend from 2015/16 to 2016/17), it may be one of the things we would have to sacrifice if we are required to meet disproportionately demanding MSLs. We are trying to avoid this by front loading FVR specific recruitment in 2017/18 and, in our detailed responses to questions 4.1 and 5.4, we propose glidepaths for both FVR and repair MSLs that properly reflect the links between these two critical areas. We consider that our proposed changes will ensure that the MSLs are proportionate, promote efficient investment and do not amount to the imposition of unnecessary regulatory burdens.[29]

66. **We welcome the fact that quality standards for fault repairs apply to all copper and superfast GEA-FTTC services.** Given the accelerated take up of these services, we agree that it is appropriate that they should be covered by these metrics.

67. **Openreach does not believe that there is evidence to support the need for the proposed additional MSLs on repair tails (i.e. SLA + 5 working days):** Section 47 of the Act requires that Ofcom only sets such conditions where it is satisfied that they are objectively justifiable. Given that our performance in this regard has improved significantly and that the existing SLG regime gives us a significant financial incentive to resolve these problems as a matter of priority, we do not believe this additional regulation is objectively justified.[30]

68. **We do not believe that there is sufficient justification for the removal of the 60-day cap on SLG payments**. It is normal commercial practice to include a cap on compensation payments in any SLA contained within a commercial contract so that liability is not open ended or unlimited. In addition, we are already incentivised to fixed these installations and repairs as soon as possible because, if a customer is out of service for 60 days, we will have already paid the CP 5 years of line rental meaning that the customer is never going to generate returns for the business. We believe that this is incentive enough without the need for uncapped payments and therefore the removal of the cap is not objectively justified[31]

69. **We support the role of the OTA2 which has been pivotal in driving through process improvement with Openreach and CPs. However the OTA2 needs to be further empowered to enable them to push through meaningful consumer driven change.** We believe the introduction of minimum CP standards, tackling the home domain CP fault rate, relooking at provision visit effectiveness and agreeing the right service/cost targets for MSLs all require extensive industry collaboration and the OTA2 support. We believe that all entities operating within the industry should contribute to an updated OTA2 code of conduct and a joint investment fund for key initiative delivery, thereby ensuring that the OTA2 can be the true champion of consumer-driven change.

29 The Act, sections 3,4,6 and 47.
30 The Act, section 47
31 The Act, section 47

3. Approach to regulating quality of service

Question 3.1: Do you agree with our proposals regarding our approach to quality of service remedies. Please provide reasons and evidence in support of your views

70. Openreach agrees with Ofcom's broad approach to quality of service remedies, specifically we support:

- The continuation of service standards, SLAs/SLGs and transparency requirements;
- That service standards should apply to installation and repair times of WLR, MPF and now GEA-FTTC services; and
- That when assessing the level of standards, account should be taken of the impact on customers, Openreach's operational capabilities and the costs to customers and the industry.

71. However, Openreach does not agree with aspects of how this approach is proposed to be implemented.

72. Ofcom's proposals for quality of service remedies are welcomed by Openreach. However, as we believe that the improvements need to offer value for money to the industry and should be valued by consumers and, for this reason, Openreach does not agree with all of the details behind Ofcom's proposed remedies.

73. We fully support Ofcom in the desire to improve the service delivered to end consumers and CPs. In fact in Openreach we have set ourselves stretching goals that drive improvements beyond the MSLs. Our Better Service, Broader Coverage and Faster Speeds programme has improved – and continues to improve – service to our customers. This programme not only looks at improving service levels but also at our products and how they are used.

74. The Better Service programme focuses on customer issues, delivering a 50% reduction in missed appointments in the second half of 2016/17, almost eliminating multiple misses and driving a 60% reduction in copper provision aged tails (PT90). This year we have set out new ambitions to continue to raise standards for our customers: these include halving the GEA Self Install (SI) in-tariff Early Life Failure (ELF) rate; achieving 83% on time repair for all service levels (and for Line Test OK faults); removing all aged tails under Openreach's control; and improving the delivery of Copper and Fibre Newsite installations.

75. We are encouraged to see, as outlined in the Consultation Document, that Ofcom recognises that the whole sector, not just Openreach, has a part to play in delivering significantly better service for consumers. We recognise that Openreach will be subject to service conditions, but we feel that Ofcom needs to place further emphasis on the impact of CPs on both end customers and Openreach.

76. Ofcom's strategy to address service improvement opportunities in the CP domain is to publish the Comparing Service Quality Report[32]. The comparative data for CPs in the report focuses on complaints and the speed of answering calls. The aim of the report is to equip consumers with sufficient information to make informed decisions, thereby giving providers an incentive to improve

[32] Published 12 April 2017

their overall service. However, the report lacks any meaningful comparative data on the service issues that Ofcom has identified as being of high importance to customers. The Jigsaw research identifies (i) high priorities for provision (in the CP domain) to be getting through to someone that can help, quality of first line support and quality of broadband set up and (ii) high priorities for repair to be the quality of first line support, speed and quality of diagnostics and overall time to resolve. The Comparing Service Quality Report does not currently cover any of these priorities.

77. In addition we consider that approximately two thirds of all service impacting events occur in the home/CP domain e.g. Wi-Fi and home connectivity interference. The challenge for industry and Ofcom is how to accelerate the technological and service development of all CPs to enable a better customer experience for these types of faults.

78. We appreciate that CPs' data capability is varied across industry and the difficulty Ofcom will have in gaining comparative data. However, we feel the current approach is insufficient to encourage CPs to deliver improvements. We also believe that, to support Openreach to deliver better service levels at a reasonable cost, it is vital that CPs invest in key areas and, to incentivise this, we propose that Ofcom should lay out a set of CP minimum standards that would need to be adhered to in the provision and repair of services. The standards could include use of latest diagnostics capabilities, use of existing network for provision and the adoption of best practice processes.

79. We are disappointed in the emphasis within the Consultation Document regarding the risk of Openreach failing to deliver beyond the MSLs. Although this might be a risk, it is clear from the evidence to date in this submission that this risk has not materialised. Openreach does not regard the MSLs as a "ceiling" – we have significantly over-delivered against these standards, as summarised in Table 2 below. In 2016/17 we out-performed our First Available Date (FAD) MSLs by more than 10% and our provision on-time MSLs by more than 4% (both expressed at a national average). Our commitment to out-performing the repair MSLs was also clear at both a national and regional level: (i) we exceeded our national MSLs for SML1 and SML2 by 8.1% and 3.7% respectively; and (ii) in our best performing patch (London), we exceeded the MSLs for SML1 and SML2 by 11.7% and 7% respectively. Please note the numbers quoted above are in terms of "percentage points" whereas Table 2 below summarises our delivery beyond the MSL in terms of "pure percentage" over-delivery (i.e. the actual result divided by MSL – 1).

Table 2 - The percentage improvement above target for service standards – UK average[33]

		2014/15	2015/16	2016/17
In Time Provision	MPF	6%	5%	5%
	WLR	4%	5%	5%
FAD	MPF	79%	43%	17%
	WLR	78%	41%	14%
On time Repair	MPF	12%	5%	
	WLR	13%	4%	
	SML1			11%*
	SML2			5%*

*note SML1 and SML2 introduced November 2016 and the period ends March 2018, the results here are up to March 2017.

80. Openreach fundamentally disagrees with the following comment made by Ofcom in paragraph 3.54 of the Consultation Document: "… *we believe that more challenging repair standards are likely to lead to stronger incentives on Openreach to reduce faults*". This statement is counterintuitive and potentially damaging to the industry as a whole (see our answers to Questions 4.1 and 4.2 for more details).

- The long lead-times associated with recruitment and upskilling could mean that, despite Openreach's commitment to growing our resource base, significant sudden increases to MSLs will lead to high levels of resource contention. In this situation, every percentage point that is added to the MSLs will in fact reduce our ability to execute FVR because it will require us to divert resource away from FVR to deal with reactive fault activities where they can help to bolster our day-to-day repair performance. In reality, disproportionate increases in MSLs will reduce Openreach's ability to execute FVR, thereby achieving precisely the opposite outcome to that which Ofcom was targeting.
- FVR is a long term solution to a long term issue (underlying network health) – even though we are extremely passionate about FVR (hence why we doubled FVR spend from 2015/16 to 2016/17), it may be one of the things we would have to sacrifice if we were required to meet disproportionately demanding MSLs (especially in Years 1 and 2 when we will still be building up a sufficiently large pool of appropriately skilled resource).

[33] 647 MSL Report archive

4. The customer experience of network reliability

Question 4.1: Do you agree with our proposal to incorporate the anticipated lower fault rate in the charge control, and not to allow a specific adjustment for the related capex? Please provide reasons and evidence in support of your views.

81. We agree with the intent of Ofcom's proposal to incorporate the lower fault rate in the Charge Control but we do not agree with the fault rate trends that have been assumed (see our response to Question 4.2 below for a detailed analysis of fault rates). We do not agree with Ofcom's approach to the funding of FVR as we believe that this does not address several key points and hence we would welcome the opportunity to work with Ofcom to agree a fair way to fund FVR investments across this Charge Control period.

82. In section 4.50 of the Consultation Document, Ofcom summarises its thoughts with the following comments and proposals:

    i. Comment: *"We want to ensure that Openreach follows through with its planned investment…"*

    ii. Proposal: "*Higher quality standards in terms of timeliness of fault repairs, which in turn should provide stronger incentives to reduce faults..."*

    iii. Proposal: "*A decrease in repair opex costs that we propose to allow Openreach to recover through its regulated charges consistent with its stated intention to reduce fault volumes…*"

    iv. Proposal: *"No additional capex to carry out network health allowed in the charge control…".*

    In the following text we respond to these four important points. This is followed by a brief summary of the key points made in our response to this question.

83. However, before addressing the details of Ofcom's proposals, we would like to comment on their scope. We believe that focusing this section of the consultation solely on network reliability (rather than a total service events/disruption measure) excludes the majority of customer-impacting issues as these occur in the customer/CP domain. Ofcom and the OTA2 should seek ways to measure and monitor all such customer-impacting events. Securing a true customer perspective on the issues that impact their experience is vital and key to this is an end to end industry measure that divides customer issues between the various owners of failure. If all participants within the industry provided this level of visibility, they would be further incentivised to do the right thing for their customers. This contrasts to the current position where we can see CPs buying cheaper installation products and in some cases saving cost in CPE, often leaving the home environment unproven for superfast or ultrafast input products on connection and activation. The importance of considering customer-impacting issues within the CP/home domain is further increased by the trends in the relevant fault rates. Whilst Openreach's investments in FVR have stabilised our network fault rate, we believe that fault rates in the CP/home domain continue to rise, driven in part by the increasing number of connected devices and ever-increasing demands for bandwidth.

84. Whilst there is limited accurate data available on the number of devices connected within the home, we can see clear evidence of sustained growth. There has been a significant growth in devices that connect to the home gateway, either through a cable (for best performance) or Wi-Fi (for convenience). In April 2016, Real Business published an article that stated that the nation's digital

advertising[34] spend was growing at its fastest rate in seven years and that the average UK home now has 8.3 connected devices, growing at an annual rate of 12%. The article also states that the growth in devices is mainly driven by the take up of new Smart TVs, which grew at the fastest rate of 27%, followed by Smartphones (21%), laptops (18%) and tablets (16%). In January 2017, Qualcomm published data[35] indicating an even more rapid increase in connected devices: they stated the number of devices in a typical family home was 8, rising to 24 in 2017 and 50 connected devices by 2022.

85. We can see a significant and sustained increase in customers' demand for bandwidth. The growth in customer usage of video services such as On-Demand TV (iPlayer etc.), Netflix, Cloud Services and You Tube (offering the streaming or downloading of Standard, High Definition and Ultra High Definition content) is driving the high volume growth of data consumed by consumers. This is evidenced in the Ofcom Connected Nations Report 2016 where the UK Consumer's Average Monthly Data usage has grown from 97 GB in 2015 to 132 GB in 2016.

(i) Openreach's Commitment to FVR

86. Ofcom's comments in section 4.50 of the Consultation Document appear to question Openreach's commitment to FVR and seem to imply that some form of regulatory compulsion is required to make us invest in the health of our network. This is not the case **– Openreach is committed to making significant investments in FVR.** Our performance in 2016/17 provides evidence of this - we doubled our FVR spend compared with the preceding year. The breakdown of our 2016/17 FVR deliverables is summarised in Table 3 below – highlighting the diversity of the work that we carry out to ensure that we deliver a balanced network health uplift. In Table 4, we express our FVR activities in terms of the investment associated with each of the FVR sub-programmes. In Table 5, we also summarise the calculated benefits from the investments that we made in 2016/17. Summarising across these views: in 2016/17 we invested £[✂]M and saved almost [✂]k faults (delivering an in-year opex saving of c. £[✂]M).

34 April 2016, Real Business article nation's digital advertising
35 Qualcomm: "802.11ax Transforming Wi-Fi"

Table 3: 2016/17 FVR Deliverables by Type of Work [36]

£[✂]

Table 4: 2016/17 FVR Investment by FVR Sub-Programme[37]

£[✂]

Table 5: 2016/17 FVR Benefits[38]

£[✂]

[36] NIMS database processed by Capital Reporting Team
[37] OrBIT Finance and Compensation dashboard
[38] Data sourced from NIMS, NEMESIS, and ARTISAN – analysis from Network Health team

87. Our FVR plans confirm our commitment to continuing this heightened level of spend: We are proposing to invest £[✂]M per annum in FVR for each of the next 4 years[39] (2017/18 to 2020/21 inclusive).

(ii) Ofcom's proposal to use higher service standards to drive Openreach FVR Investment

88. Ofcom's assertion that the best way to get Openreach to invest in FVR is to increase repair MSLs is counterintuitive and potentially damaging to the industry as a whole.

89. Resource contention could mean that Ofcom's proposals to significantly ramp-up repair MSLs will achieve precisely the opposite result to that which they are targeting. Every percentage point that is added to the MSLs will in reduce our ability to execute FVR because it will require us to divert resource from FVR to bolster our day-to-day repair activities and performance. This will be especially important in Years 1 and 2 when we will still be building up a sufficiently large pool of appropriately skilled resource.

90. FVR is a long term solution to a long term issue (underlying network health) – even though we are extremely passionate about FVR (hence why we doubled FVR spend from 2015/16 to 2016/17), it will be one of the things we may have to sacrifice if we were required to meet disproportionately demanding MSLs. We are trying to avoid this by front loading FVR specific recruitment in 2017/18 and, in our detailed responses to questions 4.2 and 5.4 below, we propose glidepaths for both FVR and repair MSLs that properly reflect the links between these two critical areas.

(iii) Ofcom's proposal to reduce assumed opex costs in line with projected fault rates

91. We agree with the principle of reducing assumed costs in line with expected fault rate/volume reductions. However, we do not agree with Ofcom's assumptions on projected fault rates – our response to Question 4.2 below provides a detailed view of this important subject and sets out Openreach's proposed alternative.

(iv) Ofcom's proposal to not allow further capex to cover additional FVR spend

92. Openreach strongly asserts that this Charge Control needs to ensure that FVR investments are fully funded. Ofcom's current position is that there should be no allowance for the planned FVR spend because it believes that Openreach should have sufficient capex to cover this. However, this assumption fails to reflect five important points:

    a. A significant proportion of our FVR spend is opex (circa 35% in 2016/17).

    b. Our accelerated FVR investment requires us to take special measures that incur additional costs (e.g. in 2017/18 we will recruit ✂engineers who will be dedicated to FVR work).

    c. Our accelerated FVR investment requires us to operate at a different point on the payback curve and we believe that this means that additional capex cover is justified.

    d. Ofcom does not recognise that the cost incurred commences before the start of the charge control period, but only makes allowances from 2018/19.

    e. Overlap of FVR benefits with efficiency assumptions.

[39] Openreach Medium Term Plan (MTP)

We address each of these points below:

(a) A significant proportion of Openreach's FVR spend is opex

93. The second part of Question 4.1 asks whether we agree with the proposal ***"not to allow a specific adjustment for the related capex"***. This question could be interpreted as implying that the costs associated with FVR are purely capex – Openreach trusts that Ofcom understand that this is not the case: indeed, in 2016/17, **circa 35% of our total FVR spend was opex**[40]. For information, the split of FVR activities between capex and opex is summarised in Figure 3 below.

£[✂]

Figure 3: Split of FVR Work between Opex and Capex[41]

94. The Charge Control should ensure that all elements of our FVR investment are fully funded, regardless of the opex/capex label given to the spend by accounting guidelines. We are concerned that Ofcom may not have taken the significant levels of Openreach FVR opex into account during their analysis of our investments in "Network Health".

95. In section 4.39 of the Consultation Document, Ofcom states that: *"**Openreach's higher than expected opex over the period may reflect the reduced capex spending shown in Table 4.5, as more heavily depreciated assets would normally be expected to cost more to maintain**".* This does not reflect the point that increasing FVR will increase opex spend in the short term because a significant proportion of FVR spend is opex. Hence, Ofcom's use of higher opex spend as an indication of insufficient FVR spend is incorrect.

[40] Openreach Finance Team
[41] Network Health Team

(b) Our accelerated FVR investment requires us to take special measures (e.g. recruit ✂ FVR-only engineers)

96. In order to deliver FVR at a heightened level of investment, we are required to take special measures that will incur additional costs.

97. An important example of this is our recently developed plan to break from our recruitment/skilling approach and bring in £[✂] engineers specifically to carry out FVR (thereby diverging from our preferred flexible resourcing model). We are doing this because we recognise the importance of investing in FVR and recognise that we have to deliver this at pace. The key elements of this plan are summarised in Table 6 below.

Table 6: Profile of Planned Investment in [✂] FVR Engineers[42]

[✂

98. We would welcome the opportunity to discuss the funding of such *special measures* (that will enable the delivery of FVR at scale and pace) with Ofcom.

(c) Our accelerated FVR investment requires us to spend more per fault avoided

99. The cost of FVR (in terms of the investment required per fault avoided) is dependent upon the scale of the investment that is being made: the more we invest, the smaller the incremental gains that we can realise. This is summarised in Figure 4 below.

[42] As presented to Ofcom on 2 May 2017

£[✂]

Figure 4: FVR Benefits vs. Cumulative Investment[43]

100. We would therefore welcome working with Ofcom to ensure that their assertion that Openreach has sufficient capex to deliver the required level of FVR properly reflects the relationship between benefits realised and costs incurred.

(d) Ofcom does not recognise that the cost incurred to deliver FVR commences before the start of the Charge Control period

101. The current Ofcom modelling approach only allows for costs that are incurred within the Charge Control period for both FVR and the wider cost of achieving the improved service levels. We believe that the incremental spend, above the base 2015/16 year, should be funded as it represents a step change in investment to underpin the service levels and fault reductions. The impact of these investments flows into future years and we would not be able to achieve the level of service proposed in Years 2 or 3 of the glidepath if we had not elected to invest in additional recruitment and upskilling in earlier years

(e) Overlap between FVR and Efficiency Assumptions

102. Openreach's response to Ofcom's 'Volume 2 Wholesale Local Access Market Review' Consultation also outlines our response to the efficiency proposals within the Charge Control period. A key element of this is a breakdown of our efficiency plans for 2017/18 and some indication of what we expect from the following years, to the end of the Charge Control period (20/21). The plans clearly show the significant contribution that FVR makes to our efficiency plans:
    - FVR contributes £[✂ M of the £[✂ M of the 2017/18 benefits that "flowed through" from 2016/17.
    - FVR contributes £[✂]M of the £[✂]M (circa £[✂]M underpinned) target in-year benefit for 2017/18.

    In total, therefore, FVR accounts for £[✂]M of our £[✂]M efficiency benefits within 2017/18 (28%).

[43] Data sourced from NIMS, NEMESIS, and ARTISAN – analysis from Network Health team

103. We are concerned that Ofcom might include the FVR impact in both their fault volume assumptions and their efficiency assumptions. In theory, provided that the changes are implemented correctly, it should not matter whether these benefits are (i) incorporated into fault volumes and excluded from efficiency or (ii) excluded from fault volumes included from efficiency. **However, it is essential that Ofcom does not double-count these benefits as both an efficiency improvement and a volume saving.**

Summary of Openreach's response to Question 4.1

104. In summary, whilst we agree with the principle of factoring FVR benefits into fault rate calculations, we disagree with the values assumed for this (see our answer to Question 4.2 below for details).

105. We have highlighted several concerns with Ofcom's proposals around the funding of FVR. We are concerned that Ofcom's misunderstanding around FVR spend classification (i.e. the fact that **FVR spend is split between capex and opex**, rather than just being purely capex) has not only impacted their views on funding models but may also have distorted their views on Openreach's commitment and delivery in this area. In particular:

- Ofcom's analysis of Openreach's opex and capex trends does not appear to reflect the important dynamic that increased FVR will actually drive up opex in the short term.
- We are concerned that this misunderstanding might have negatively influenced Ofcom's view of Openreach's commitment and achievements regarding FVR. The last FAMR was set against the back-drop of network fault rates increasing at [✂]% year-on-year. Our investment in FVR and our increased focus on quality have now arrested this increase[44] and **we are now preparing for a Charge Control where the debate is around the timing and scale of future reductions in fault rate**.

106. We have also highlighted our strong belief that fault reduction is a team game that requires all industry players to contribute. In section 4.39 of the Consultation Document, Ofcom links opex spend to equipment failure as follows: "*For example, older equipment may be more prone to breaking down and would likely require engineers to reactively repair it more frequently*". This might refer to various types of equipment, but much of the active equipment for copper broadband resides within the CP domain and we would welcome Ofcom focusing some attention on the customer issues linked to CP hubs and exchange-based equipment (e.g. MSANs/DSLAMs). Openreach does operate NGA-related equipment and, even though this is a relatively new platform, in this consultation response we set out our plans to invest heavily in this equipment to ensure that it stays at the forefront of technology[45].

107. In summary, we have highlighted our concerns about the potential for double counting our FVR investments as both an efficiency and as a volume saving. We propose that Ofcom ensures that it has "netted off" this potential saving from either their efficiency assumptions or from their fault volume predictions.

Question 4.2: In Annex 5 we have set out our forecast for fault rates. Do you agree with our forecast? Please provide reasons and evidence in support of your views.

[44] Annualised network fault volumes between 2015/16 and 2016/17 were virtually flat at 0.3%
[45] Openreach's response to Volumes 1 & 2 "Wholesale Local Access Market Review" consultation

108. Openreach does not agree with Ofcom's fault rate forecast. Openreach's plan of record forecast for network fault rate is [✂]% of 2015/16 levels by 2020/21. However, we believe we have 'line of sight' to [✂]% of 2015/16 levels by 2020/21 which is still higher than Ofcom's view of [✂]%. This difference is responsible for a c. £[✂]M delta between our assessments of the financial positions resulting from this charge control. Below, we present detailed analysis of this important subject and propose a more realistic forecast, taking into account the most recent decisions and dynamics.

109. We believe that Ofcom's fault rate forecasts are largely based upon an Openreach presentation, shared with Ofcom in July 2016 (reproduced below as Figure 5 below). When we presented our Medium Term Plan (MTP), our base case investment for 2016/17 was £21m per annum. However, our aspiration was to go further – increasing spend to £[✂]m, £[✂]m, and £[✂]m for the years 2016/17, 2017/18, and 2018/19 respectively. However, the only element of this that was financially committed was the £[✂]m in 2016/17 (please note we delivered against this commitment, thereby halting the year-on-year increase in network fault rate that has characterised recent years). The scenario that we believe Ofcom has built into the Charge Control was our aspirational plan to increase spend further to £[✂]m over the next two years – this had not received formal sign-off and, based on our latest plans, we do not now consider that this is appropriate.

110. The significance of this assumption is apparent from the chart that was presented to Ofcom (see Figure 5[46]): we believe that rather than using our ***base plan*** (see orange line on the chart shown bottom left) Ofcom has based its fault volume predictions on the ***aspirational*** alternative (blue line).

£[✂]

Figure 5: Screen shot of Network Health presentation shared with Ofcom in July 2016

111. Our increased focus on (and investment in) FVR that has enabled us to halt the rise in network fault rate, compared with the [✂]% year-on-year increase that provided the backdrop to the previous FAMR. However, we are now investing in FVR at levels that have not been seen in recent years. Considering the changes in customer expectations, technology mix, engineering efficiency and resource utilisation since 2009/10 (when we last spent on FVR at this level), it is not surprising that

[46] Openreach presentation to Ofcom – Ian Lawrence, Director Network Health: "Improving the Health of the Openreach Copper Network" July 2016.

we are learning a great deal as we execute our plans.

112. In particular, we have learnt much about the challenges that we face as we invest so heavily in improving our network health – both in terms of the practical issues associated with deploying this level of resource and the fault rate headwinds that reduce the net benefits that we can deliver. Below, we summarise the 13 key challenges that we have identified to date.

113. **Challenge 1 – Sufficient availability of suitably skilled resource.** To ensure maximum responsiveness and efficiency, Openreach operates with a flexible workforce, with many of our engineers able to carry out provision, repair and FVR activities. This means, however, that every aspect of Openreach's operations can be impacted by all of the others, for example an abrupt rise in repair or provision demand can impact our ability to execute FVR. In 2016/17, we observed that Openreach's multiple diverse commitments/requirements all competed for the resource that had the skills required for FVR, and managing that conflict became a critical success factor for our efforts to improve the underlying health of our network. Historically we have not recruited engineers solely to carry out FVR, but we are making an exception to this in 2017/18 with [✂] new FVR recruits planned to help us ease some of the resource contention we face in the short term (and also in the longer run to provide an additional succession pool to our highly skilled Network Solutions teams). Further detail on this is provided in our response to question 4.1 (above).

114. **Challenge 2 – Upskilling our workforce.** FVR activities are intended to uplift the quality of our network. To deliver benefits, therefore, the quality of the work being carried out has to be as high as is practical: e.g. there is no point re-making a cable joint if the workmanship associated with the activity is not of a sufficient standard to leave the network less prone to faults than it was before the work was executed. The skills needed for FVR are typically some of the most challenging that we demand from our workforce and hence are not ones that all of our engineers have. Broadly speaking, we class most of these as Underground (UG) skills, and during 2016/17 and 2017/18 we expect c. [✂] engineers to be upskilled to UG, representing a step-change in the level of multi-skilling within our engineering workforce. The cost and operational impact of this is significant.

115. **Challenge 3 - Recruiting additional engineers.** Whilst the upskilling outlined above has significantly boosted the number of UG-skilled engineers available for FVR, it is not enough to meet all of the parallel demands for resource (provision, exceeding repair MSLs, broadband faults, chargeable work, FVR etc.). As a result, during 2016/17, we recruited [✂] field engineers, which was a net increase of [✂] (i.e. [✂] of our new recruits were required to compensate for attrition). Our current plans see us continuing recruitment at these elevated levels throughout 2017/18 and beyond.

116. As mentioned throughout this response, Openreach is fully committed to making significant FVR investments during this Charge Control period. Important evidence for this is provided in our recently developed plans to break from our recruitment/skilling approach and bring in [✂] **engineers specifically to carry out FVR** (thereby diverging from our standard flexible resourcing model). Details of this initiative are provided within our response to Question 4.1.

117. **Challenge 4 – Time to competence.** When we bring new engineers into the business (or when we give new skills to an engineer who is already in post), there is an important lag between them joining the business and becoming fully competent. During this unavoidable period of learning, they are significantly less effective and consume considerable amounts of resource from around the business (training, buddying, coaching, "assists" from colleagues), driving total costs significantly

above those apparent from a simple headcount for the organisation. Figure 6 below gives some further detail around this issue, summarising the new recruit time-to-competence that we currently experience for NGA self-install (FTTC SI) and basic repair (CAL). We do not yet know, however, how quickly our [✂] "FVR only" engineers will master the various complex tasks associated with this work – this will be further learning for us in 2017/18.

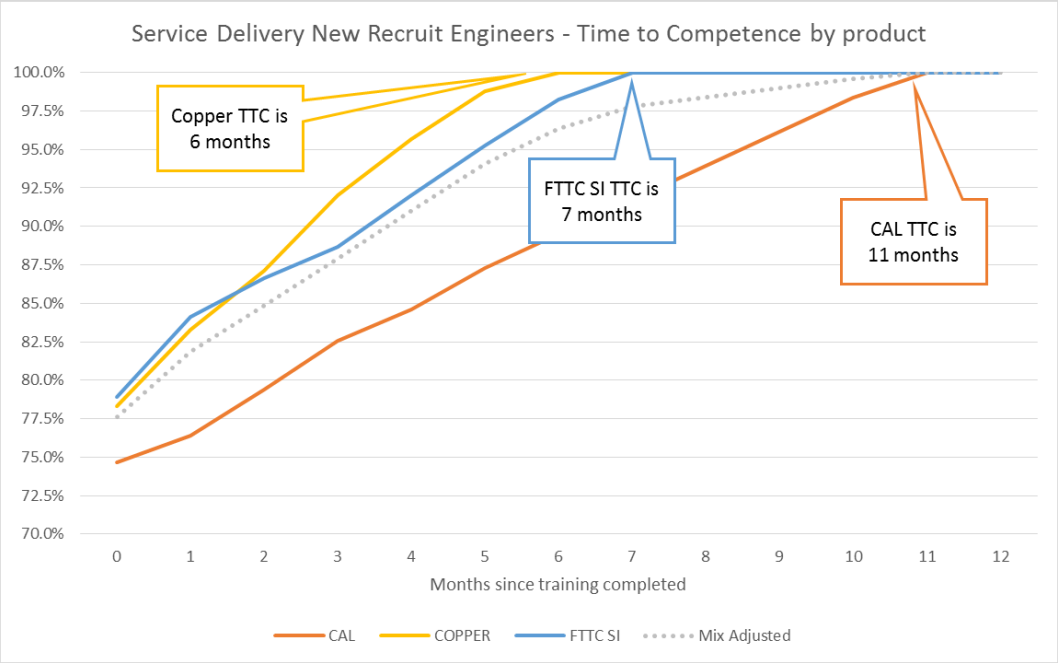


Figure 6: New Recruit Time-to-Competence[47]

118. **Challenge 5 – FVR and third party labour.** We believe that FVR is best carried out by our skilled and committed engineers, rather than relying on third party resource. This approach fully aligns with our union agreements which specify that contractors should only be used for network build and provision activities, with FVR and repair being reserved for direct labour only. During 2016/17, we spent ~£[✂]M of our FVR investment on re-building the most fault-prone cabinets (in areas where we expect to deploy G.fast in the future). As this was essentially build activity, our unions supported us in the use of contractors for this very specific one-off activity. This tranche of work has now come to an end and the re-built cabinets are now delivering a reduced fault rate. However, this initiative served to highlight the challenges of using contractors in this way - they find it difficult to work with the intricacies of our network (in comparison to established direct labour resource) and this has reinforced our commitment to the use of direct labour for proactive maintenance in future years.

119. **Challenge 6 – Reduced productivity due to the focus on service – leading to reduced resource availability for FVR.** Our business already delivers high levels of productivity and efficiency as evidenced by the comparisons of prices in different countries around Europe (Figure 7 below[48]). The darker bars on this chart show the wholesale prices (in the UK, the prices charged by Openreach) whereas the lighter bars show the retail prices (the prices charged by CPs). As shown,

[47] Service Delivery – UK South analysis
[48] Cullen international: "Wholesale line rental - Regulation and prices"; CTTEEU20170041 - April 1, 2017 - Janne Kalliala

it is clear the UK (Openreach) has the lowest WLR prices of any of the major European economies.

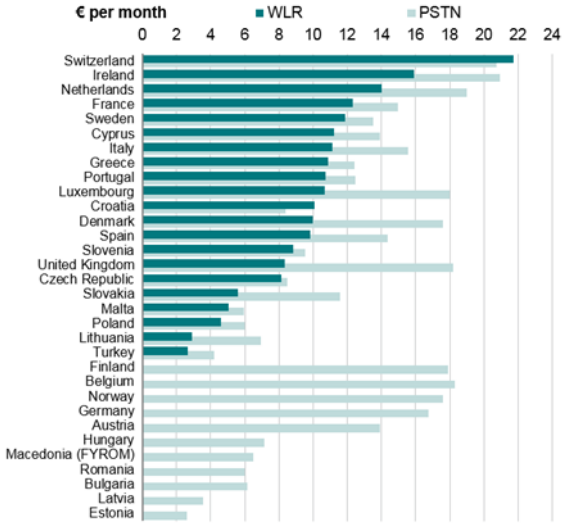


Figure 7: Comparison of Wholesale and Retail Prices across Europe

Whilst these low wholesale prices are excellent news for the UK telecommunications industry, our high levels of efficiency mean that there are few short term addressable levers to improve efficiency available and that additional efficiency gains will be hard won. We built our capacity plan for 2016/17 on the assumption that we could still deliver task-time efficiencies, despite our intense focus on service. Whilst we have always acknowledged that there is a trade-off between service and efficiency, we have tended to over-estimate our ability to overcome this. To understand the fundamental nature of the service/efficiency trade-off, it is perhaps useful to consider the two extreme cases:

- In a hypothetical situation where ***service is the only driver***, we would dimension our workforce to meet the peak of demand and run at a low level of utilisation so that we would always have an engineer available to dispatch when a fault is reported. As soon as a fault is reported, we would dispatch an "*idle*" engineer immediately. We would take no account of the time-of-day and would dispatch an engineer to start a task even if there was little chance that they could complete it *on-the-day*.
- In the opposite extreme – where ***efficiency is the only driver*** – the approach would be very different. If there was no requirement to fix a fault within a certain time, then work would be *parked* until there was a sufficient volume of work available within a geographical area to minimise time wasted on travel. We would wait until the engineer who is most efficient (at that type of work in that area) becomes available. We would only dispatch the engineer when the time available is sufficient for him/her to complete the entire bundle of work on that day.

120. Neither of these two extremes would be acceptable in practice – in reality we have to select the point along this continuum that delivers the appropriate balance between ***service*** and ***efficiency***. However, the argument presented above also makes it clear that we cannot optimise for both

service and efficiency – they are, to a large extent, a trade-off[49]. We built our capacity plan for 2016/17 on the assumption that we could still deliver task-time efficiencies, despite our intense focus on service. Although we understood that there would be a trade-off, we under-estimated the scale of its impact as we have not tried to deliver such a step-change in service in recent years. As a result, the capacity plans that we built prior to the start of 2016/17 significantly under-called the resources that would be required to deliver on-time repair throughout the year. The extent and nature of this shortfall is summarised in Figure 8 below, both in terms of repair visits and KMH (kilo-man-hours). This clearly has a knock-on impact on FVR – any such productivity "*miss*" will mean that we need more engineers working on repair and provision, thereby leaving less resource available for FVR.

£[✂]

Figure 8: Planned versus Actual Repair Visits/KMH Resource Required for 2016/17[50]

121. **Challenge 7 – Balancing FVR against the need to exceed repair MSLs.** Our FVR spend in 2016/17 delivered £[✂]M of in-year opex benefits for a total cost of £[✂]M. In other words, it was roughly one third as efficient a way to spend cash as standard reactive repair if viewed on a one year basis. Whilst this ignores the fact that FVR will deliver benefits into subsequent years as well, it does demonstrate a key point that if Openreach is struggling to meet in-year demands, FVR is a relatively less attractive investment given the serious consequences of missing MSLs (including the potential imposition of fines). It also leaves us in a position where we cannot afford to build a resource plan containing any risk - which is hugely challenging given the dynamic environment that we operate within. That is why we think it is important to ensure fault volumes, FVR plans, efficiency and MSL service uplift plans are all modelled accurately as a collective. We want to be committed to all of our promises across all these areas and ensure that we are not left making short term trade-offs to take resource away from FVR to work on customer-reported faults (where they can deliver approximately three times the level of in-year benefit). We want a sustainable, balanced and progressive plan but it needs to be accurately modelled and adequately funded.

Challenge 8 – Balancing FVR against provision demand. In addition to the repair-MSL supporting work mentioned above, our resource is also needed to support provision work. The ultra-

[49] This is also analysed in Openreach's response to Ofcom's 'Volume 2 Wholesale Local Access Market Review' Consultation

[50] 2016/17 Capacity Plan vs. Actual volumes (from Openreach Geo Tracker)

competitive nature of the UK telecommunications market – and NGA retail in particular – means that CPs will use special offers and time-limited deals to create periods of high customer acquisition. This leads to sharp spikes in provision demand (as the market reacts to such offers) and these market responses will often lead to competing CPs responding with their own offers. The net result of this is a market with unpredictable peaks of demand, all of which have to be met within our provision MSLs. Given that exceeding our MSLs is our most important commitment, once we have exhausted all of other resource flex options (e.g. contractors, additional over-time, reducing shrinkage etc.) we may have no option but to scale back FVR to resource provision activities in the short term. To guard against this and to ensure we have good forecasted and underpinned provision delivery, we believe it is vital that CPs continue to provide complete and accurate provision forecasts for copper and fibre. In addition, better notice (2-3 weeks out) of offers or incentives which affect weekly volumes and may drive variances in the short term to CPs official forecasts would help us make better use of our flex capability.

122. **Challenge 9 – Defect "find rate".** Our FVR targeting is based upon multiple inputs, with the three main ones currently being (i) defect reports (referred to as A1024s) from our engineers (ii) fault history (iii) electrically-measured network health. Our most valuable FVR targets (i.e. the jobs where we have the greatest confidence of delivering a genuine uplift to network health) are the ones where we get indications of a problem from all three of these sources and these are the jobs to which we typically assign the highest priority. However, we do not have a limitless supply of such high value investment opportunities – we have a certain "*find rate*" with which we add targets to the FVR candidates list and, if our *fix rate* exceeds our *find rate*, the total number of high-priority addressable jobs starts to decrease. Whilst this is good news in the sense that it suggests that we are turning the tide on our underlying network health, it does impinge on our ability to make the most of our FVR investment. Figure 9 below summarises recent trends in the new defects being reported by an engineer – the recent increases are a direct result of our increased focus on quality and demonstrate that we have been successful in convincing our engineers that we take quality very seriously and hence they should report any defects that they encounter.

£[✂]

Figure 9: New A1024 Defect Reports by Priority[51]

123. **Challenge 10 – Ensuring that we deliver value for money.** Building upon the *find rate* point covered in the paragraph above, we need to do all we can to ensure that our FVR investments deliver value for money. Figure 10 below shows the priority of the jobs that we have been completing, confirming that we are doing a good job of focusing on the higher priority opportunities despite the need to align our FVR work with the local availability of skilled resource. It should be noted that the occasions when we do work that is not priority 1 or 2 should not be regarded as a *bad thing* – we encourage our local engineering teams to use their insight to push jobs to the front of the queue where their local knowledge suggests that timely intervention is required. A good example of this would be a recently damaged joint in a joint-box that is prone to flooding: before we have any rain, that could look like a very low priority job (as it might not yet be faulting and its electrical characteristics may well look normal) and so in this case we need our engineers to tell us that we should move quickly to fix this before the rains arrive and have a potentially serious impact on every customer served via that joint. Figure 10 also demonstrates what happens as we execute FVR with a fix rate that exceeds the find rate – in the latest weeks shown, we have started to select more work from the lowest priority "*Monitor*" cohort to ensure that we have sufficient work to ensure our workforce remains productive with suitable FVR work. Whilst these jobs are being carefully chosen to optimise benefits, it is unavoidably true that this work will have a higher risk of not delivering value for money. This is a very important point governing what is the right amount of FVR to attempt to execute in any year – whilst we would not use this to claim that £[✂]M p.a. was precisely the optimum level of spend, it certainly suggests that the returns on spend significantly beyond this point will be much harder to guarantee. The cumulative result of our FVR execution (and the associated prioritisation process) is shown in Figure 11. This clearly shows that we are making significant in-roads into the high priority outstanding jobs.

51 Analysis of Network Health A1024 database

£[✂]

Figure 10: Completed A1024 Defect Reports per Week (by Priority)[52]

£[✂]

Figure 11: Outstanding A1024 Defect Reports by Priority[53]

124. **Challenge 11 – Headwind from Self Install:** In 2016/17 we saw an increase in the number of Early Life Failures (ELFs) that we recorded. A key element of this is FTTC Self Install (SI) – whilst this product has been successful in giving our CPs a low-cost, non-appointed provision option, it is far from satisfactory from a quality assurance perspective for the following reasons.

- Our engineers cannot access the customers' premises to carry out a full end-to-end "test on completion";
- The hub is often not plugged in/powered up, thereby preventing our engineer from confirming service; and
- Our engineers cannot address any issues associated with the home-wiring (and as a result we are detecting internal wiring issues on circa 20% of lines post-install[54]).

52 Analysis of Network Health A1024 database
53 Analysis of Network Health A1024 database
54 Service Delivery analysis of Brandenburg bulk diagnoses results

The volume of FTTC SI has continued to increase during 2016/17, growing [✂]M ([✂]%) year-on-year to [✂]M, and is the dominant dynamic across our provision landscape (which in aggregate only grew [✂]M to [✂]M year-on-year). As a result, the volume of Early Life Failures (ELFs) associated with network faults increased by circa [✂]% year-on-year from 2015/16 to 2016/17 (cancelling out the benefits arising from the circa [✂]% reduction in in-life network faults). These trends are summarised in Figure 12 below.

£[✂]

Figure 12: Network Faults - Early Life versus In-Life Fault Trends[55]

125. **Challenge 12 – Headwind from increasing network interventions.** In addition to the ELFs noted above, the significant increase in FTTC provision activity has also driven an increase in field intervention faults. These are faults which occur on circuits that are in close proximity to lines that are the subject of provision or repair visits. We analyse each of these interventions and use a combination of various indicators to estimate which of these engineering activities probably resulted in a fault being triggered on a neighbouring circuit. The result of this analysis is an estimate of faults that are likely to have been intervention faults – Figure 13 below shows recent trends for this in the field (i.e. intervention faults within our network rather than in the exchange). The recent trend is clear – as the balance of network activity shifts from the exchange frame to the cabinet, this is driving an increase in field intervention faults. The impact of these increased interventions is felt particularly at the cabinet – Figure 14 below demonstrates a sharp increase in line with the recent increases in intervention faults. Reducing intervention faults is an important area of focus for Openreach in 2017/18 and we are confident that we can drive improvements here (although the ever-increasing capability delivered from our cabinets will mean that this is likely to remain a significant headwind in the short to medium term).

[55] Network Health team analysis of line age data in cdta.fault

£[✂]

Figure 13: Recent Increases in Field Intervention Faults[56]

£[✂]

Figure 14: PCP Fault Trends[57]

126. **Challenge 13 – Headwind from the introduction of NGA2:** During 2016/17 we started to see the first impacts of G.fast build-out on our fault rate. In areas that were being prepared for build-out we saw additional faults as we prepared cabinets and had to cut into network that may previously have been left undisturbed for many years. Whilst minimising the impacts of G.fast on the rest of our network is possible, some consequences are unavoidable and, as NGA2 gathers pace over the Charge Control period, we expect this to be a dynamic impacting our overall network fault volumes.

Summary of FVR investment plans

127. Based on our learning from the challenges we faced in 2016/17 (outlined above), we have revised our FVR investment plans and our estimates of the benefits that they are likely to generate. Whilst the cumulative spend over the next 5 years is expected to be similar, we have smoothed it to allow service flex to protect customer service MSLs, whilst ensuring required recruitment levels are achievable. We believe that Ofcom generated its fault volume forecast from an aspirational scenario that was shared with them by Openreach in July 2016. This is compared with our latest views in Table 7 below. As shown, based on all we have learned in 2016/17, we do not believe that the scenario used by Ofcom is appropriate (and that we are already 2.5% adrift from the fault volumes that Ofcom has assumed).

[56] Network Health team analysis of "intervention flags" within CDTA.Fault
[57] Network Health team analysis of Clear Code analysis

Table 7: Comparing Ofcom's scenario with Openreach's Latest View (Network Faults)[58]

£[✂]

Table 7 also shows the assumed annual investment in each case: although the total spent over the 5 years is similar in the two scenarios (within 5%), the resulting fault volumes are very different. This disparity is explored in Figure 15, and the key messages associated with the two images are as follows:

- **Cumulative delta between scenarios:** The difference in the benefits delivered (i.e. the reduction in fault volumes) is driven by two main factors: (i) the timing and level of Openreach's investments and (ii) the revised headwind assumptions. As the chart shows, circa 75% of the cumulative delta between the scenarios is due to the changes in assumed headwinds (i.e. our differing assumptions regarding the level and timing of FVR investments is not the dominant factor here).
- **Impact of assumed fault "downlift":** If we use Ofcom's "CPI-X" model to convert the FVR assumptions into financial impact over the charge control period, Ofcom's assumed fault volumes reduce Openreach revenues by circa £[✂]M – compared with a "*flat*" fault volume assumption. However, we do not expect fault volumes to be *flat* – even with the headwinds described above, we are confident that our FVR programme will drive annual network faults down to circa [✂]% of current levels by 2020/21. Compared to this baseline, Ofcom's fault volume assumptions reduce Openreach's funding by circa £[✂]M more than we believe to be appropriate or reasonable.

£[✂]

Figure 15: Comparing Ofcom and Openreach Fault Volume Scenario[59]

Based upon Openreach's latest view of fault volume dynamics, we have produced a repair waterfall showing the expected repair volume movements across 2017/18. This is shown in Figure 16 below.

[58] Ofcom "2015-16 QoS adjustment – BT Version"; FVR Plans from Director of Network Health
[59] Service Insight analysis of data presented in Figure 3 and Table 8

£[✂]

Figure 16: Repair Volume Waterfall for 2017/18[60]

128. In summary, our latest FVR plan sees us driving down network fault rates to [✂]% of current levels (by 2020/21), thereby reversing the recent trend of increasing network fault rate. We propose that Ofcom uses this revised view (as its current proposal reduces Openreach's funding by circa £[✂]M more than we believe to be appropriate or reasonable).

Question 4.3: Do you agree with our assessment of the role better diagnostics could play in improving fault resolution for both telecoms providers and customers, and how should these improvements be realised? Please provide reasons and evidence in support of your views.

129. Openreach agrees that better diagnostics will play a role in improving fault resolution for end customers and CPs.

130. In recent years Openreach has invested heavily in both test equipment and Big Data analytics and has implemented a range of new capabilities to improve the overall accuracy and reach of our diagnostics platforms but there is still further work to do. It is vitally important to understand that the end to end broadband service delivery is the joint responsibility of both Openreach and the CPs as both parties provide key components of the overall service. In our view excellent customer experience will only be delivered when there is a full end to end approach taken which is customer centric rather than each party trying to prove faults on or off their network. Key to realising improved diagnostics are (i) close collaboration across industry (ii) taking an end to end customer centric approach and (iii) continued investment and innovation in improved diagnostics by both Openreach and CPs. Below, we provide further information on key issues associated with this important area.

[60] Analysis from Network Health team

131. **Openreach Test and Diagnostics (T&D) strategy**. Setting robust technical and service specifications, against which to test all customer circuits, is becoming increasingly difficult as there are no specific performance standards for xDSL (due to natural variation in length and make-up of the network, increasing issues with distributing high speed services around homes and variation in services used by the end customer e.g. TV, voice, email or browsing). The move to products such as Single Order GEA (SOGEA) will make us more dependent on service layer based diagnostics. Therefore the Openreach test and diagnostic strategy is to combine traditional electrical parameter testing (against generic specifications such as SIN349) with a Big Data analytics approach that allows us to capture baselines and historic performance for each line under test and to define more local performance standards at network node or line level based on actual performance.

132. **Collaborative approach with industry is essential**. Openreach provides a diagnostic service free of charge to the CPs to help their fault diagnostic processes but there are often significant delays in CPs consuming and exploiting these tools and data feeds which means overall performance and customer experience is adversely impacted. The need for further diagnostic improvements across industry and Openreach is supported by relatively high proportions of Line Test OK faults (25% to 35% dependent upon product) and the relatively high repeat rates for both copper and NGA at (~13%). Detailed root cause analysis on ineffective visits and rework visits confirms that much of the waste and inefficiency here is due to an ineffective interlock between the CP process and the Openreach process. In addition, whilst there are some blind spots in the diagnostic tools and opportunities to improve diagnostic location accuracy, there are also imperatives to improve agent and engineer training and compliance across the end to end assurance journey with the CP and Openreach people.

133. **The Line Test OK (LTOK) Problem**. We know the current arrangements for dealing with LTOK faults can lead to poor outcomes for customers and it is an area where, as an industry, we need to do more. Often the CPs do not accurately capture and diagnose the fault symptoms that are impairing broadband performance and some fail to consume and utilise our full testing capability to help fully diagnose customer faults. In general CPs are reluctant to incur charges on LTOK faults which means customers can experience delays or multiple interactions with their CP before their problem is resolved. The high levels of LTOK faults also puts pressure on Openreach's field resources due to the increase in demand for skilled and well equipped technicians.

134. **Proactive repair opportunities**. We believe it is vital that as an industry we seize the opportunities enabled by the broadband performance and service layer diagnostics to move towards a more proactive service assurance approach but this has to be done in a collaborative fashion and supported by an appropriate pricing/economic model. We also believe more work is needed across industry to tackle the issues with distributing high speed broadband services around homes and developing new capabilities to monitor, measure and understand more about performance in the home environment as well as the network.

135. **Collaborative approach on T&D and Big Data.** Openreach is committed to a collaborative approach with industry, focusing upon improving diagnostic capabilities through data sharing and Big Data exploitation in order to improve customer experience and reduce cost of failure. Openreach regularly updates industry on the performance of its diagnostics and actively informs CPs of any changes that may impact their processes/systems. A collaborative approach enables more effective diagnosis of issues from an end to end perspective, thereby negating some issues and inefficiencies that have resulted from the move from a vertically integrated business model.

136. **Industry Test and Diagnostics Forum**. Openreach instigated the Industry Test and Diagnostics Forum that allows CPs and Openreach to discuss technical diagnostics change and aid agreement and validation of improvements that will benefit end customers, CPs and Openreach. Openreach remains committed to this level of technical collaboration.

137. **Service layer data based diagnostics model**. Openreach believes that the best way to improve diagnostic capabilities for the future is through the use of Big Data analytical tools. Openreach has therefore made a significant investment in Big Data analytics over the last 24 months to identify and develop new capabilities to further improve diagnostic accuracy. Openreach is gradually making the transition from copper electrical parametric testing to a more customer experience centric diagnostics solutions based on complex interpretation of broadband service performance data. We believe that the Openreach diagnostics Big Data initiatives will deliver significant benefits to Openreach, CPs and ultimately customers. It has the potential to further improve remote diagnostic capabilities and will also allow better targeting for preventative maintenance (FVR).

138. **CP support for the Openreach Big Data programme.** The Openreach Big Data platform is already open for business and all of the major CPs are collaborating and sharing their service layer data with Openreach. In addition Openreach has developed several new service layer metrics and tools which are also being shared free of charge with industry. All of the big CPs are actively starting to use xDSL service layer data in agent systems to improve fault qualification. Bilateral discussions continue with other CPs with the aim of bringing more CPs on board. Service layer data sharing and in particular the exploitation of recent service performance history provides a more effective insight to support the diagnosis of complex service issues that cannot be diagnosed with a "*one-shot*" test as well as providing a robust indication of the overall state of a circuit. More focus is needed from our CPs and industry to industrialise and embed these new capabilities into their fault qualification processes.

139. **Progress on service layer diagnostics**. Openreach is delivering improvements to diagnostics now as part of an ongoing improvement programme. Improved diagnostic capabilities based on and underpinned by Big Data analytics are increasingly being used to improve the accuracy and confidence in diagnostic outcomes. Big Data is used to tune the diagnostic outcomes by evaluating millions of results against fault data and service outcomes (repeats, furthers etc.). This has led Openreach to improvements in the way problems are diagnosed and located, providing better insights into appropriate resolutions including appointing, engineer skill type and dynamic line management treatments. This enhanced diagnostic information also enables the CPs to make more informed choices on the right action to take, such as sending to Openreach, requesting a customer appointment or using their own services to resolve the customer's problem.

140. **Early service layer applications (Speed and Stability)**. Initial focus and progress has been on developing normalised metrics on broadband rate reach for customer's lines against expectation and recent performance. We are also exploiting historical service layer data to identify unstable and degrading service performance and validating poor customer experience. We are now trialling ways of using speed and stability indicators/data to improve the resolution of complex faults and prevent repeat fault report occurrences.

141. **Real time "Trimetrics" to reduce repeats.** We are currently trialling new tests looking at real time performance parameters that can be compared before and at the end of a visit to give an indication of whether the broadband performance is likely to improve when dynamic line management next acts after a physical line impairment has been detected and improved. This Trimetrics solution

enables an engineer to judge whether or not there has been a tangible improvement in the performance of the service before the fault is closed.

142. **Using service layer data to requalify LTOK faults**. Where service layer data shows lines to be healthy, stable and performing at a level expected for that circuit, Openreach believes there are opportunities for CPs to use this knowledge at the point of customer contact to investigate additional possible causes of the reported issue with the customer (before assuming that reporting the fault to Openreach would be the most effective course of action).

143. **Baselining and neighbour data applications.** Projects that Openreach will trial shortly include baselining and neighbourhood analysis to help indicate if a customer's line is performing similarly to its neighbours within the network. Neighbourhood analysis, taking due account of type of service, technology, line-length etc. will give additional confidence as to whether an issue is likely to be specific to that customer (in-home, dropwire, lead-in) or is common to other customers connected to the same final distribution point in which case the cause of the common issues is more likely to be in the Openreach network.

144. **Maintaining the copper test platform.** Openreach has committed to significant investment in upgrading the copper test infrastructure over a five year programme. The older test heads in the estate are being upgraded along with the remaining old network communications links. This is to ensure that test system performance is maintained and that there is a good platform upon which to build further improvements.

145. **Overnight routine test**. A significant platform upgrade was implemented in 2014/15 and is producing more stable and repeatable outcomes. This is a foundation for improving diagnostics by analysing copper line performance over time and making comparisons to a known good state.

146. **NGA Improvements.** Changes were made in February 2015 to improve the diagnostic accuracy of Openreach GEA service test platform with the "Brandenburg NGA" project. This improved the ability to locate intermittent fibre broadband faults on the Openreach network and home environment.

147. **SELT (Single End Line Test).** SELT for NGA was deployed in September 2016 to improve diagnostic accuracy for broadband service faults. The SELT test has improved the diagnostic and dispatch accuracy of NGA service test in both service provision and fault repair.

148. **Copper Integrated Demand Testing (CIDT)**. In 2012 Openreach introduced new testing functionality on its exchange based line test equipment. This functionality is very effective at detecting high resistance faults that conventional exchange-based line tests cannot detect.

149. **Hand Held testing capabilities.** Over the last 5 years Openreach has made a significant investment and equipped all its field engineers with world class advanced test equipment that can perform electrical line tests and broadband service layer tests. These testers can detect line and customer wiring problems more effectively than conventional line tests because the tests are two-ended (the hand-held tester works in conjunction with the exchange based test equipment). In addition we have completed system integration into the main service assurance processes so that all test results are stored and provide an audit trail on field work completed and a data store to evaluate test effectiveness and allow optimisation of test scripts and test limits. Openreach is now looking at next generation test instrumentation to both support new technology (G.fast) and make the most of advances in hand held test capabilities.

150. **CP Contribution:** As Ofcom notes throughout the Consultation Document, delivering excellent service is a team game that requires all players within the industry to contribute. To effectively progress and manage repair, Openreach would suggest a minimum standard of information / action to support the submission of a fault by a CP:

- Establish their customer's specific issue and supply verbatim commentary to Openreach for reference;
- Complete a diagnostic journey with their customer to eradicate any issues beyond Openreach's remit to influence or resolve;
- Utilise all diagnostic tools made available by Openreach to establish line and service conditions prior to submission;
- Add all relevant notes regarding the customer's experience including services impacted, frequency / severity / timeframe experienced, and the level at which the service was sold or has been working (as applicable); and
- Provide regular and robust Service Layer Data feeds through which Openreach can establish health markers for reported faults, and through which customer service experience can be better understood.

5. Regulating BT's service performance for repairs

Question 5.1: Do you agree with our proposals to set standards on repairs delivered to SMLs 1 and 2 timescales? Do you agree with our proposal to set new standards for repairs completed five working days over SLA for SMLs 1 and 2? Please provide reasons and evidence in support of your views.

151. Openreach agrees it is appropriate to set standards on repairs delivered to SML 1 and 2 timescales. We also agree that if an NGA FTTC SML1 variant is launched and consumed by CPs in the future, this should also be included within the remedies. We do not believe that the introduction of a repair tails MSL (SLA+5 working days) is justified.

152. We agree with Ofcom that CPs place a greater priority on certainty of repair over speed of repair**.** This is evident through CPs wishing to give a confirmed timescale for when the service will be restored to their customers at fault reception. Feedback from our engineers suggests that CPs are confirming to customers that faults will be cleared no later than 4 to 5 days, despite the SML being shorter than this. Openreach has provided daily reporting on average time to clear (ATTC) by SOM patch on our portal to help providers manage the expectations of consumers.

153. We agree that measuring a remedy at SML1 and SML2 takes account of market changes between the maintenance levels. We would expect to see a continued shift down in the SMLs offered to customers if Ofcom's proposals are set at 93%. We would also expect the business service SML Business 2 plus to become redundant. This effectively means in reducing prices and raising standards Ofcom will lead the industry towards a "*race to the bottom*" without actually improving the explicit service commitment that the CPs advertise and embed into their promises to customers.

154. Openreach does not believe that there is evidence to support the need for further remedies to regulate the handling of repair tails (i.e. lines awaiting repair for more than 5 days beyond SLA). Our performance on repair tails has been strong (as shown in Figure 17 below), thereby providing clear evidence of (i) our commitment to delivering improved service in this regard (ii) our insight into the root causes of this issue and (iii) our ability to convert our insight into sustained high performance.

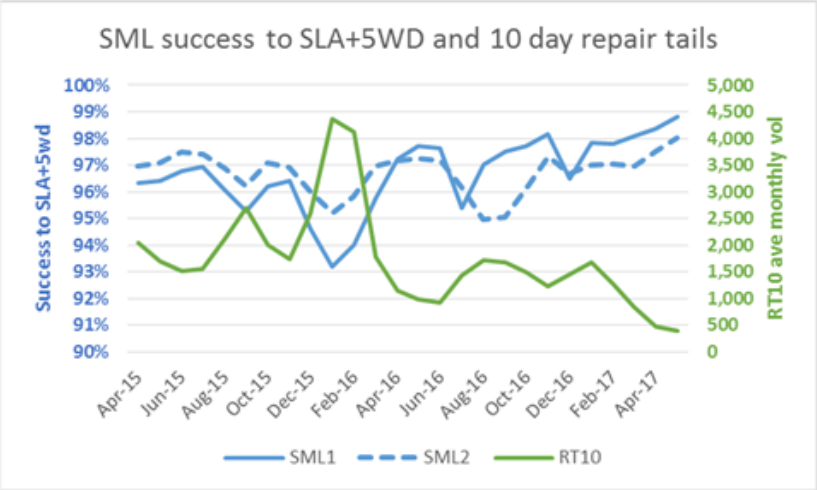


Figure 17: Openreach Repair Tails Performance[61]

155. Given our strong performance on repair tails, and noting that Section 47 of the Communications Act requires that Ofcom only imposes such conditions where it is satisfied that they are objectively justifiable, there does not appear to be sufficient justification for further onerous regulation at this time[62]. Accordingly the repair tail quality of service standards 4 and 6 should be deleted.

Question 5.2: Do you agree with our proposed structure for the QoS standards? Please provide reasons and evidence in support of your views

156. Openreach agrees MSLs should be set at the same level for SML1 and SML2. Openreach further agrees that, for each relevant SML, the results should be from the combined product set of WLR3 PSTN, LLU MPF, and GEA-FTTC.

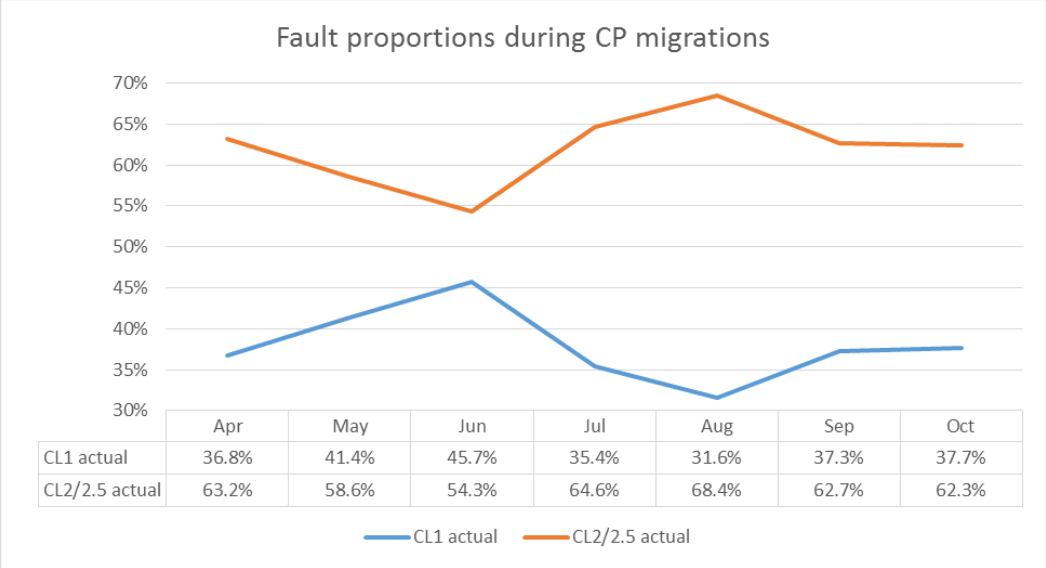
157. Openreach notes that this consultation relates to *"broadband and telephone services to customers and businesses"*. There is however an absence in relation to the base SML of business lines – SML Business 2 plus. This is a next working day service level with the same SLA/SLG requirements as SML2/20, and accounts for around 2.4m lines (as of April 2017). Inclusion of SML Business 2 plus with the SML2 MSL would lead to more of the customer base captured within the regulatory minimum standard.

158. **For the reasons set out above, Openreach proposes to include SML Business 2 plus within the SML2 MSL definition.**

159. We would like to see conditions set out by Ofcom to ensure suitable notice periods or allowances are made for short notice changes by CPs in SMLs. Whereas we have managed this effectively over last year, a CP upgrading its services at short notice would risk missed commitments to customers, degraded quality through use of short term resource and potentially failure against MSLs.

[61] Tails data from 524 report; SLA+5WD from 647 report (or equivalent)
[62] The Act section 6

160. Openreach encountered severe strain in the summer of 2016 as some major CPs migrated their asset bases to different SMLs. The short notice delays in these migrations created a bow wave of SML2 customers over the summer period, as summarised in Figure 18 below. Whereas Openreach tried to programme these bulk orders to manage their impact, last minute delays from CPs created a SML2 demand beyond our capacity.



	Apr	May	Jun	Jul	Aug	Sep	Oct
CL1 actual	36.8%	41.4%	45.7%	35.4%	31.6%	37.3%	37.7%
CL2/2.5 actual	63.2%	58.6%	54.3%	64.6%	68.4%	62.7%	62.3%

Figure 18: Fault Proportions during CP Migrations in 2016

161. This led to extreme resource pressure, as the lead times given by the CPs were not long enough for us to mitigate through recruitment.

162. Given the importance that Ofcom ascribes to service within this consultation, the logical conclusion is that at some point within this Charge Control we should expect CPs to move more customers to SML2. Given that we cannot recruit, upskill and buddy engineers within the likely timescales of any such decision, we propose that Ofcom supports the introduction of a 6 month lead time for high volume bulk migrations of SML, thereby ensuring that we have sufficient time to react to these significant changes.

Question 5.3: Do you agree with the proposed levels of the repair standards? Please provide reasons and evidence in support of your views.

163. We do not agree with Ofcom's Repair MSL proposal because we believe that the Year 3 Repair MSL of 93% is unachievable based on the current industry practices and the service regime. In the following text, we provide extensive evidence to support this statement and provide a comprehensive justification for our proposal that 90% (87% post MBORC allowance) is a proportionate (yet still highly challenging) level at which to set an MSL. It is perhaps worth reiterating a key point that applies throughout our response: this is a process to set a minimum regulatory service level that has to be met in every patch in every year and not a process to define Openreach's targets for service uplift. As we have demonstrated, we will set our targets beyond the levels defined by the MSLs. We also believe that a MSL of 90% in Year 3 would address our concerns about the proportionality of the MSLs and general compliance with Ofcom's statutory obligations.

164. We do not agree with Ofcom's "SLA+5 working days Repair Tails MSL" proposal because, as outlined in our response to Question 5.1, we do not believe that this additional MSL is justified. However, if Ofcom implements this MSL notwithstanding our submissions, we agree that 97% represents a reasonable yet sufficiently challenging Year 3 target.

165. As emphasised throughout this document, Openreach is committed to driving up the standard of the service that it delivers to industry. Whilst we are pleased to have exceeded our MSLs to-date, we recognise that there is still much more to do, and we agree with Ofcom that the current repair MSL of 80% (77% post-MBORC) is not high enough.

166. We support Ofcom's view that repair quality of service should be a central element of the consultation. However, as the depth and breadth of information presented within the answer to this question demonstrates, this is a complex area with many facets that each need careful consideration. In particular, in this section of our response we will focus on the following areas:

a. Minimum versus Target Service Levels
b. Repair service glass ceiling
c. Double counting glass ceiling benefits within efficiency forecasts
d. Impact of Service Maintenance Levels (SMLs)
e. Matters beyond our Reasonable Control (MBORC)
f. Fault Volume Reduction (FVR) plans
g. Recruitment and upskilling timescales
h. Unintended impact on network health beyond this Charge Control
i. On-time measure issues
j. Geographical variations
k. Delivering value-for-money

a. **Minimum versus *Target* Service Levels**

167. **Openreach is committed to exceeding MSLs – rather than just meeting this minimum acceptable level.** This is demonstrated in Table 8 below which compares our delivered performance in 2016/17 with the specified post-MBORC MSL targets:

Table 8: Comparison of Delivered Performance and MSL[63]

	Year to date MSL Performance (RAG 2017/18 targets)					
Ofcom MSL Performance	WLR3 FAD	LLU FAD	WLR L2C On Time	LLU MPF L2C On Time	WLR3 & MPF SML1	WLR3 & MPF SML2
Scotland	98.1	99.3	94.6	94.8	86.9	79.1
North East	99.3	99.9	95.6	95.2	84.1	80.8
North West	98.9	99.9	95.2	94.5	86.2	82.8
North Wales & North Midlands	96.3	97.4	94.3	93.8	85.1	81.9
South Wales & South Midlands	95.1	96.8	94.2	94.2	85.4	82.0
Wessex	92.8	94.6	94.7	93.9	86.1	81.5
South East	97.0	98.2	94.5	94.2	86.4	83.3
London	93.3	96.1	94.5	93.3	89.3	84.7
East Anglia	94.7	96.5	94.4	93.8	84.2	80.1
Northern Ireland	99.0	99.8	95.1	96.4	91.5	80.9
UK	96.3	97.9	94.7	94.3	85.9	81.7
2017-18 Target Hits	10	10	10	10	10	10
Targets 2017-18	79.0	79.0	89.0	89.0	77.0	77.0

[63] 647 MSL report archive – year to date performance to w/e 9 June 2017

168. In 2016/17, we exceeded every one of our MSLs. The Consultation Document suggests that we treat MSLs as a ***ceiling*** rather than a ***floor*** – but the evidence presented in Table 8 proves that this is not correct. In our response to question 4.1, we describe the trade-off between service and productivity – if we regarded MSLs as a ceiling, we would have backed off our service performance across all of these measures and reduced costs as a result. Our commitment to out-performing the repair MSLs is clear at both a national and regional level: (i) we exceeded our national MSLs for SML1 and SML2 by 8.1% and 3.7% respectively; and (ii) in our best performing patch (London), we exceeded the MSLs for SML1 and SML2 by 11.7% and 7% respectively. This demonstrates that **we treat MSLs as a floor and exceed them where we can.**

169. Given our proven ability and commitment to exceeding the MSLs, the distinction between a Minimum Service Level and a Target Service Level becomes critical. We will continue to strive to deliver service at levels well above those specified in the MSLs and so it is critical that the MSL is viewed as the minimum acceptable level of service in the lowest performing area. With Openreach's proven willingness to commit the resources to over-deliver against MSLs, Ofcom can be confident that we share their view that the **target** level of repair service performance should be **above 90%**. However, in the subsequent parts of the answer to question 5.3, we highlight why this level is not appropriate for a MSL.

b. Repair Service *"Glass Ceiling"*

170. In the Consultation Document, Ofcom repeats a view of the repair glass ceiling (figure 5.6 in paragraph 5.40) that Openreach presented to Ofcom. This is reproduced below as Figure 19.

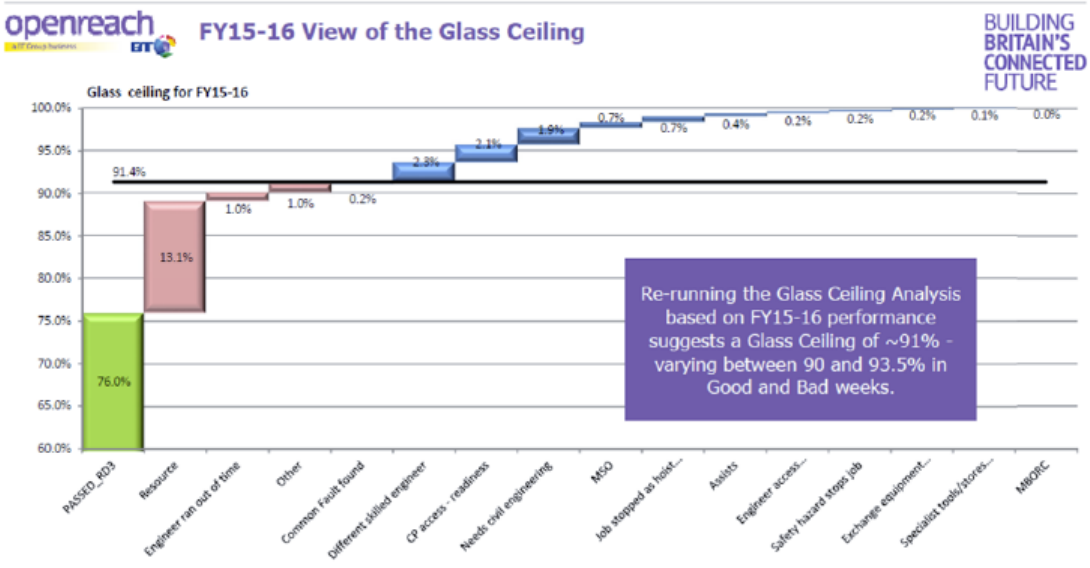


Figure 19: Openreach's Initial View of the Repair Glass Ceiling[64]

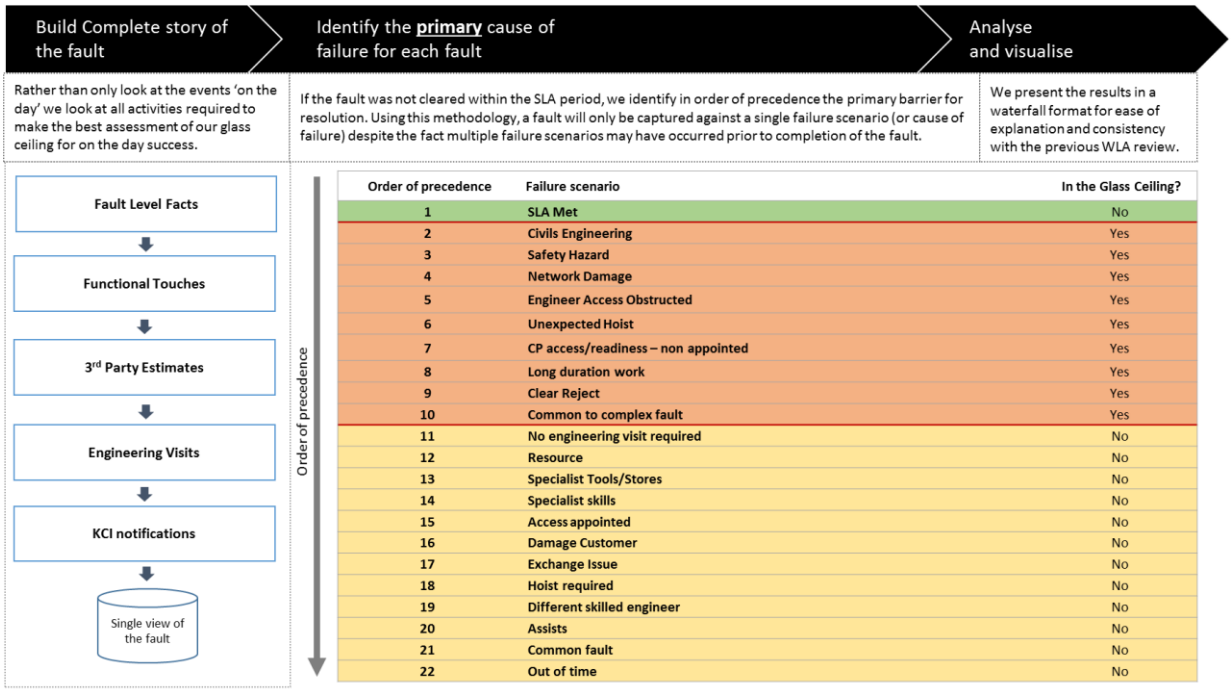
171. Ofcom has misinterpreted the previous glass ceiling presented as being "*expressed in terms of successful on-the-day field activities*" (paragraph 5.42 in Consultation Document). Whilst the previous glass ceiling analysis did use field activities as a basis for deciding upon whether or not faults were in the glass ceiling, it was not the sole basis – for example, civil engineering was measured based on the evidence of a 3rd party estimate not based on the failure of a field activity.

64 Ofcom: "Quality of Service Remedies"; Figure 5.6 in paragraph 5.40

We do however agree with Ofcom's statement that a *"proportion of on-the-day failures relate to matters such as an engineer requiring assistance could be addressed at a further attempt the following day"*. In response to these points, and to present the most accurate view of the glass ceiling, we have restructured the analysis with the following key changes:

- We consider all events and all visits that take place from the point of receipt to the point of fault closure rather than focusing on the 1st engineering visit. The inputs are summarised in Figure 20 below.
- We have split customer access and readiness issues between those where we have an appointment and those where we do not. We explain our rationale in more detail below.
- We have included scenarios that were missing from our previous analysis, and revised our view on what failure scenarios should be considered within the glass ceiling.

The diagram below explains the revised glass ceiling methodology and the key inputs and rules within it. The failure scenarios and our rationale behind their inclusion in the glass ceiling is summarised in Annex 1.



Order of precedence	Failure scenario	In the Glass Ceiling?
1	SLA Met	No
2	Civils Engineering	Yes
3	Safety Hazard	Yes
4	Network Damage	Yes
5	Engineer Access Obstructed	Yes
6	Unexpected Hoist	Yes
7	CP access/readiness – non appointed	Yes
8	Long duration work	Yes
9	Clear Reject	Yes
10	Common to complex fault	Yes
11	No engineering visit required	No
12	Resource	No
13	Specialist Tools/Stores	No
14	Specialist skills	No
15	Access appointed	No
16	Damage Customer	No
17	Exchange Issue	No
18	Hoist required	No
19	Different skilled engineer	No
20	Assists	No
21	Common fault	No
22	Out of time	No

Figure 20: **Openreach's revised Glass Ceiling methodology**[65]

172. An important point that does not appear to have been considered by Ofcom in its Consultation Document is the precedence of the causes of failure assumed in any such waterfall representation. The chart has to be read from left to right – with each block of failure masking any subsequent failure further to the right. The implications of this are significant – it is not correct to assume that resolving or dismissing one cause of failure will turn the associate block of outcomes from failure to success. For example, Ofcom appears to imply that Openreach could remove half of the 2.3% of failure that is "*due to the need for a different skilled engineer*" (to which our specific response is given below) and then assume that all of this will convert into on-time successes. In reality, we find

[65] As presented to Ofcom on 25 May 2017

that many of these edge cases fail against multiple *glass ceiling* criteria and so – in fact – will be converted from failures into a mixture of successes and different failures**.** To illustrate this point, 56% of faults in our revised glass ceiling fail analysis fail on multiple criteria. As a result, the simple analysis presented by Ofcom in paragraphs 5.41 to 5.45 of the Consultation Document is incorrect. In the text below, we presented a corrected version of this, updated to reflect our most recent performance and the refinements we have made to the glass ceiling analysis.

173. The logical error outlined in paragraph 172 is compounded by a specific error arising from Ofcom's misunderstanding of the current on-time measure definition. A key element of Ofcom's justification of lower *Glass Ceiling* is as follows[66]: "*Moreover, Openreach's on-the-day performance equates to a higher performance against the service maintenance level SLAs because… on-the-day failures classified as 'CP access – readiness' (accounting for 2.1% of failures) do not count as failures against the SLA because the failures were caused by customers or telecoms providers. This covers delays to repairs caused by, for example, an Openreach engineer having no access to the customer's premises, the customer not being present, ready, or available, and telecoms provider equipment issues*". Whilst Openreach is in complete agreement with Ofcom that such failures should be excluded from the definition of on-time success/failure, **it is unfortunately the case that the current measure definition does not include a comprehensive exemption for this[67]**. We believe that Ofcom's misconception around this may stem from the fact that there **is** an exemption granted for the instances where we have an **appointed** fault for which we cannot gain access. Given that, for Line Test Not OK (LTNOK) faults, only 20% of faults are appointed, the cases where we do not get an exemption (80% of LTNOK) are clearly a source of considerable concern for Openreach. ***The scenario in question is where we dispatch an engineer on a non-appointed fault journey and, after carrying out testing and diagnosis at various points within the network, conclude that the issue cannot be resolved without access to the customer's premises***. Whilst Openreach Test and Diagnostic (T&D) systems do a good job of minimising the number of occasions when this happens, it is unreasonable to expect that this will never happen:
    - Openreach – in partnership with the CP – diagnoses the fault and choses to appoint/not appoint a fault based on the results of a **single-ended line test** from the exchange and the **discussion that the CP has with the customer**.
    - The CP's discussion with the customer is critical – they need to collect key pieces of information from the customer around the nature of their service issue, their home environment, the equipment that they have plugged in, any possible damage to home wiring etc. Any omission in the information supplied by the customer will significantly impact the ability of Openreach and the CP to correctly diagnose the problem.
    - The **line-test** is also critical. A typical line will be around 2km long and the wiring between the distribution point (DP) and the network termination is typically 30 metres long. The DP is usually the final point of intervention for our engineers if they do not have an appointment so, if we believe the fault to be in the region of the DP, we have a difficult decision to make: if the fault is the exchange-side of the DP or at the DP itself, we do not need an appointment; if the fault is just 1 or 2 metres beyond the DP, an appointment will be required. As a result, to get 100% accuracy on the decision to appoint, we would need our line-test system to be able to determine the *distance to fault* with an accuracy of least 99.9%. Given the inaccuracy present in all such electrical measurements, and considering the scale of our network and the

[66] Ofcom: "Quality of Service Remedies"; paragraph 5.42

[67] As explained later in this section, meaningful exemptions exist for WLR but not for MPF

accuracy of our cable records at this resolution, this level of accuracy simply is not possible.

- Based on the inherent uncertainties in the line-test and the information supplied by the customer/CP, our decision to appoint/not appoint is therefore taken on the *balance of probabilities*. In partnership with our T&D suppliers (Tollgrade), we analyse the detailed electrical characteristics of the line and use this to create a specific diagnosis (or "T-Code"). For each T-code, we have a default decision on whether or not to appoint based on how *likely* it is that the clear will be in a location for which we would need an appointment. In general terms, if the overall likelihood is greater than circa 50%, we appoint the fault; if the likelihood is less than 50%, we dispatch an engineer without an appointment.
- Whilst implementing an appointment cut-off at 50% probability sounds reasonable, it is important to note what this means in reality. For all of our *borderline* diagnoses, we are effectively building in up to 50% risk of on-time failure (leaving us to depend upon *serendipitous access* which cannot be relied upon).
- As we continue to increase our service aspirations, the failure due to this becomes an unacceptably large part of our unavoidable failure. There are some limited on-time exemptions provided to cover elements of this but these are product-dependent.
    i. **For MPF**, when we find that we need an appointment on an initially unappointed repair, we are only allowed any form of 'concession' if we can offer the CP/customer an appointment for a slot that falls before the original SLA date/time. Given that the original "unappointed no access" may well have been encountered on the due date, there is obviously a relatively low chance of being able to achieve this (hence why we have a low on-time success rate for such faults). If we are able to offer the CP an appointment before the original SLA date/time, then we are permitted to move the RD3 target date back to the date of this newly agreed appointment (regardless of the appointment date/time that the customer accepts).
    ii. **For WLR3,** the rules are different: we get an 'exemption' as long as we send an appropriate KCI message to the CP by 1 pm of the day following the initial (unsuccessful) visit.
- As part of our drive to deliver ever-higher service levels, in 2016/17 we attempted to start to address this issue and, with the support of the OTA2, proposed to appoint three of the borderline diagnoses where we believed there was a 40% to 50% probability of access being required[68]. The three diagnoses in question are highlighted in red in Figure 21 below. Despite the fact that we were able to demonstrate that our proposal would deliver a significant increase in service performance, it was strongly opposed by CPs – no CP would accept our offer to trial this service enhancement.

[68] The proposed change would have generated an additional 1.4k appointments per week (across industry), increasing the percentage of LTnOK faults that are appointed from 20% to 23%.

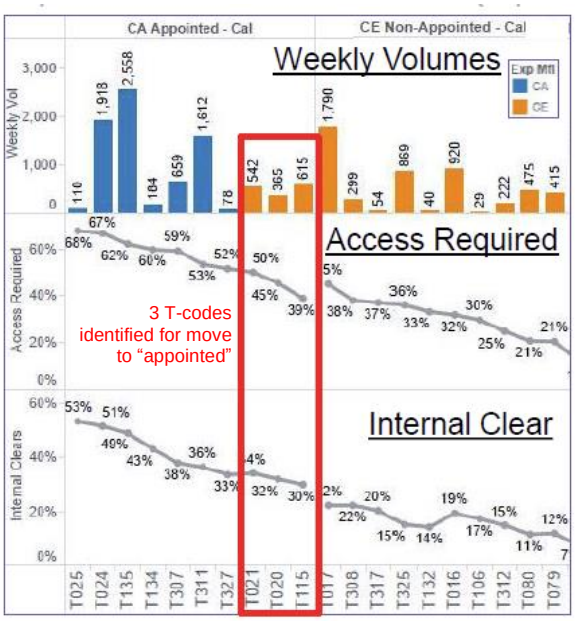


Figure 21: Proposal for Improved Service via Additional Appointing[69]

- CPs were very clear on this issue – their customers did not want the inconvenience of appointments that *might* be unnecessary (and they did not want the cost of managing those appointments) and hence they were happy to trade-off Openreach's wasted engineering effort and on-time success to achieve their preferred result. Whilst Openreach fully appreciates the customers' perspective concerning appointments, we cannot support this level of failure if we are to deliver the proposed service levels.
- Ofcom could choose to correct their misunderstanding of the Glass Ceiling explained here in a number of ways. One approach would be simply to reinstate this element of the glass ceiling and move all of the repair MSLs target down by circa 2% to reflect this important issue (in addition to the numerous other required alterations that are highlighted elsewhere in this document). However, this still leaves a conflict within our industry: Openreach could respond to MSL-pressure by significantly increasing the level of appointing, even though CPs oppose this and customers will be further inconvenienced. Openreach's recommended approach is therefore somewhat different – we would prefer to refine the measure to align with Ofcom's original interpretation: *i.e. the initial visit on an "unappointed no access" is excluded from the on-time success measure provided that the premises was visited before commitment date/time.* In this way, we can commit to a higher MSL than would otherwise be possible whilst avoiding the need to inconvenience CPs and customers by significantly increasing the proportion of faults that we appoint. We already have systems in place with which we can demonstrate that the visit took place within the agreed timescales and we would be very happy to work with Ofcom/industry to ensure that a fully auditable process was in place that would give the industry confidence that we would implement this exemption in a fair and reasonable manner.

174. Having undertaken an extensive analysis of the reasons why we failed to deliver faults on time over the last 3 years, we have also identified a number of scenarios that were missing from our previous

[69] Service Insight analysis of T-codes and clear codes within cdta.fault (and associated task-level data)

analysis, and incorporated them into our revised version as follows:

- **Faults requiring no engineering visit, including those that are common to, or dependent upon, complex faults** – our previous analysis incorrectly excluded faults that had no field or frames engineering activity recorded against that unique fault. We have corrected this and in so doing we have identified three broad categories of failure: (1) the customer-reported fault was dependent upon the resolution of another complex fault, which was not possible for Openreach to resolve within SLA, (2) the customer fault was resolved remotely beyond SLA and (3) the customer reported fault was dependent upon the resolution of another fault, which was not a complex fault. Category (1) have been identified separately as "*Common to complex faults*" and categories (2) and (3) have been summarised within a "*No engineering visit required*" category.

- **'Long duration faults' requiring a very large amount of engineering work to complete -** because it is extremely challenging to schedule and complete a job that requires more than 8 hours of engineering time, especially when some of that time is associated with time related charge requests that we cannot predict prior to dispatch.

- **CP rejected clears –** because CPs are able to simply reject our fault clears without the need to demonstrate that there is still an issue and we do NOT get any additional time to investigate the issues that they raise. It is worth noting that whilst only c.5% of WLR3 and NGA faults are rejected, 77% of these are rejected with an OK or inconclusive (DT) test.

- **Unexpected hoists –** whilst we cannot accurately predict and resource hoists prior to a first engineering visit, it is important to separate hoist requirements that we are typically able to serve on the day of request (and do so with a c.75% success rate) from those that are highly impractical to resource on time. Examples of the latter case are when we only identify the need for a hoist following a customer access failure or when we require multiple hoists on separate engineering visits. Whilst we are improving the way we plan, allocate and dispatch hoist drivers, we do not believe it represents value for money to increase our 75% on the day success rate for hoist dispatch beyond 90% because it would require a high number of under-utilised hoist vehicles and drivers, particularly to cover rural geographies.

- **Network damage –** this is because we have very little influence to mitigate faults caused by third parties damaging our overhead and underground network.

Having addressed the points raised in the paragraphs above, we present our updated view of the Repair Glass Ceiling in Figure 22 below. By taking account of all events across the lifecycle of faults, we have lowered our assessment of the glass ceiling, based on the same criteria as our previous analysis to 88.7% in 2016/17, 87.6% in 2015/16 or 88.2% in 2014/15. However, in the revised Glass Ceiling we have also drawn a distinction between *red* failure scenarios, which are not within Openreach's ability to influence, and *amber* failure scenarios that are to some extent within Openreach's ability to influence, but which none the less will arise in the normal course of business due to fluctuations between demand and supply. At a national level and based only on *red* failure scenarios, we identify a maximum possible glass ceiling of 92.6%. In reality, we do not believe it is practical, or represents value for money to address all amber failure scenarios and therefore conclude that the real Glass Ceiling is in the range between 88.7% and 92.6%.

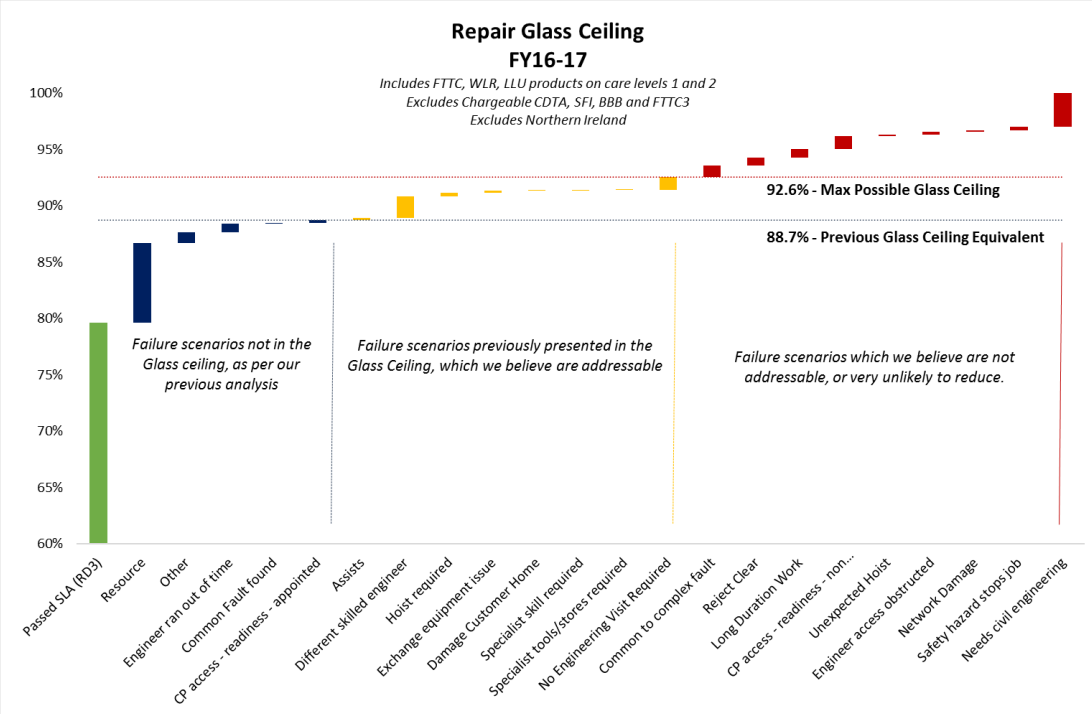


Figure 22: Revised Repair Glass Ceiling, based on most recent financial year[70]

175. Whilst we cannot see a way to raise the glass ceiling to the levels suggested by Ofcom in its document (96.6%), we agree with Ofcom's view that several key areas of failures are at least partly addressable through operational and process improvements. In response, we have assessed planned and potential Openreach improvements which represent value for money for industry, and anticipated headwinds in our performance (e.g. due to increased network build, rising consumer expectations or less clement weather than we have experience in 2016/17). This analysis is summarised in Table 9 below. We have also demonstrated and quantified two identified structural process and measure changes that Ofcom could impose to raise the glass ceiling by (i) correcting the on-time measure to give Openreach an exemption when customer access and readiness issues are encountered on non-appointed faults and (ii) removing the *Clear Reject* process from the WLR3 and NGA products, bringing them in to line with MPF, or ensuring that the SLA counter is reset at the point Openreach receive a clear rejection from the CP alongside valid notes and proof of dialogue with the customer[71].

[70] Service Insight analysis into fault and associated task-level data
[71] We currently get limited exemption for on-time failure caused by Clear Reject based upon the eventual 'accepted' clear code. However, the scope of this is insufficient to properly address this issue.

Table 9: Addressability of Glass Ceiling Components

Scenarios	FY 1415	FY 1516	FY 1617	Rationale	Estimated Openreach Reduction	Post Openreach Improvement	Post Industry changes
'Amber' scenarios i.e. to some extent within Openreach's ability to influence							
Assists	0.08%	0.26%	0.21%	Increased availability of resources will reduce propensity to fail for non-skilled assists, and increased multi skilling will reduce skilled assists. But new recruits and newly skilled engineers, who have a higher propensity to require assistance, will create a headwind. In addition, there is a proportion of assists that are mandatory for safety reasons e.g. replacing a drop wire over a road.	50%	0.10%	0.10%
Different skilled engineer	1.24%	1.91%	1.86%	We do not believe it is practical or effective to have a workforce that is 100% multi-skilled, as explained in section 5.4 of this document. It is also not possible to diagnose fault location to a 100% accuracy or always get a different skilled engineer on site within SLA. However, we accept Ofcom's challenge to reduce the impact of this scenario by 50% through skilling and diagnostic improvements.	50%	0.93%	0.93%
Hoist required	0.22%	0.31%	0.32%	In FY1718, we will be introducing improvements to the way we plan, allocate and dispatch Hoists.	30%	0.22%	0.22%
Exchange equipment issue	0.12%	0.13%	0.14%	We will seek to eradicate failure where we are not dependent upon CPs. Moreover, a shift from MPF to NGA is also likely to reduce the impact of this scenario.	50%	0.07%	0.07%
Damage Customer Home	0.00%	0.00%	0.00%	No change expected, very limited impact.	-	0.00%	0.00%
Specialist skill required	0.00%	0.04%	0.06%	Openreach will reduce this failure scenario through local skilling, equipment and continuous improvement initiatives	50%	0.03%	0.03%
Specialist tools/stores required	0.01%	0.01%	0.04%		50%	0.02%	0.02%
No Engineering Visit Required	1.37%	1.45%	1.36%	The introduction of a new commons process, improved desk SLAs and resourcing, and more robust SLAs with our technology suppliers will enable Openreach to significantly reduce this failure scenario.	70%	0.41%	0.41%
'Red' scenarios - outside of Openreach's reasonable control							
Common to complex fault	1.88%	2.00%	1.10%	Reduction in 16-17 due to FVR and a very dry year. We are challenging ourselves to hold 16-17 performance in spite of less favourable weather conditions through FVR and E-side pressurisation improvements.	0%	1.10%	1.10%
Reject Clear	0.70%	0.81%	0.73%	Potential for small reductions through existing industry engagement but only with more proactive action from CPs. A shift from MPF to NGA will create a headwind, which we expect to counteract reductions made.	0%	0.70%	0% *(Abolish Clear Rejects)* 0.38% *(Reset SLA on Clear Reject)*

				Re-setting SLA			
Long Duration Work	0.46%	0.51%	0.76%	Plan to mitigate rise seen in the last 2 years, despite headwinds from higher bandwidth products.	0%	0.76%	0.76%
CP access - readiness - non appointed	1.76%	1.18%	1.06%	Recent experience has shown no appetite from CPs for appointing more. Furthermore, CPs actively looking for more non-appointed repair. Without an exemption, as suggested above, there is little if any opportunity to mitigate this failure scenario.	0%	1.06%	0% *(Exclude from OTD measure)*
Unexpected Hoist	0.28%	0.16%	0.17%	Assume neutral as improvements to the hoist process and availability unlikely to mitigate these scenarios within SLA	0%	0.17%	0.17%
Engineer access obstructed	0.26%	0.15%	0.20%	No line of sight to improvement	0%	0.20%	0.20%
Network Damage	0.10%	0.11%	0.13%	Expect growth in Network (3rd party) damage to continue with increasing network build out and increasing access for 3rd parties through duct and pole sharing arrangements	0%	0.13%	0.13%
Safety hazard stops job	0.22%	0.33%	0.31%	No line of sight to improvement	0%	0.31%	0.31%
Needs civil engineering	3.16%	3.11%	2.97%	FY16-17 benefited from drier weather with less E and D-side faults. Continued FVR and focus on civils reduction likely to counteract headwinds from network build out, duct and pole sharing, and weather.	0%	2.97%	2.97%
GLASS CEILING	**11.9% (88.1%)**	**12.5% (87.5%)**	**11.3% (88.7%)**			**9.2% (90.8%)**	**7.4 – 7.8% (92.2 - 92.6%)**

176. Using 92.2% **(including exemption for no access on non-appointed faults and a reset SLA on reject clears)** as a reasonable representation of what a maximum glass ceiling would look like, we have carried out analysis of how this varies between GM areas: the worst performing patch is **1.5%** below the average (see Figure 23 below). Even if we assumed that we could use High Level MBORC declarations to protect us from the worst of these local variations, we would still have to cope with the impact on the 3rd worst patch: **0.7%**. Given that the MSL applies at a GM level and is supposed to define the minimum acceptable level of service, this means that the national Glass Ceiling figures discussed in the preceding paragraphs (and the MSLs that result from their use) needs to be lowered by **0.7%** to **1.5%** to reflect the local variations (as the MSL has to be met in every patch).

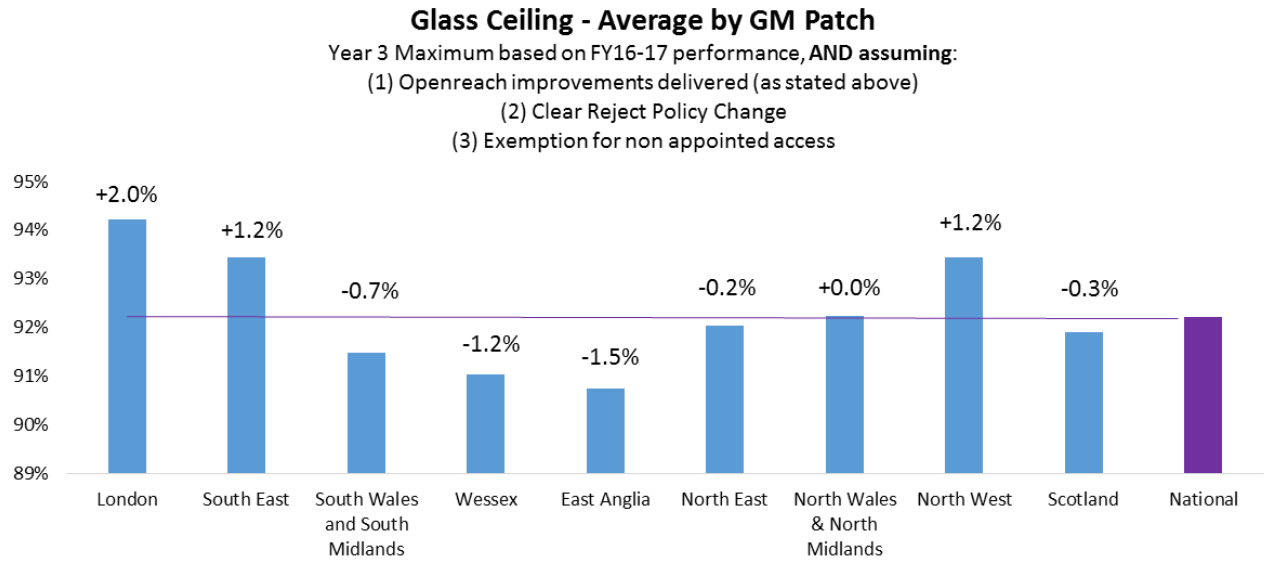


Figure 23: GM-Level Geographical Variation in an Artificially Uplifted Repair Glass Ceiling [72]

177. Based on our revised analysis described above**, the revised Glass Ceiling of 92.2% at a national level and 90.9% in the worst GM demonstrates that an MSL of 90% (93% pre MBORC allowance) represents a maximum not minimum service level.** There will be patches where we can get to 93-94% but we cannot do it in every patch. Furthermore, the Year 3 MSL of 90% is only achievable if the following conditions are true:

- The on time delivery measure is corrected to give full exemption for customer access and readiness failures on non-appointed faults (across all products).
- Either the SLA clock is reset upon receipt of a clear reject from CPs and CPs provide updated notes and proof of customer contact or the clear reject process is removed from the WLR3 and NGA product definitions.

c. "Double Counting" Glass Ceiling benefits within efficiency forecasts

178. Openreach is committed to running an efficient organisation and, every year, we design, build and execute an extensive programme of Transformation activities to reduce wasted effort and drive up productivity. Typically, reducing wasted effort focuses on identifying ways to eliminate the volume of visits that do not add value: indeed, **60%** of our Transformation benefits in 2017/18 are expected to come from such volume-based efficiencies. A clear example of such efficiencies is where a visit that does not complete a repair (or fundamentally add value to the journey) is eliminated.

[72] Service Insight analysis into fault and associated task-level data

179. The Consultation Document sets a very challenging target of 5.5% for year-on-year efficiency improvements[73]. To deliver this over the three years requires a total improvement of 17.4%, which is an extremely challenging target for an organisation as efficient as Openreach. Using the 2017/18 programme as an indication of the likely breakdown of Transformation benefits across the whole period, that would suggest that the improvements would be split 10.4%/7% between volume and unit efficiency savings. As described above, Ofcom's analysis assumes that Openreach will find ways to raise its glass ceiling and estimates its resource uplift figures (and hence cost) on this basis. Whilst Ofcom does not specify the likely nature of such changes, it is likely that the bulk of any such improvements would be built around eliminating visits that did not lead to a completion and, instead, ensuring that a fault could be resolved in fewer visits and before the committed completion date. Consequently, therefore, any improvements that we make to our glass ceiling are likely to be part of our Transformation plans and therefore need to be *netted off* from the assumed 5.5% year-on-year target (please note that extensive discussion of efficiency is presented in Openreach's response to Ofcom's 'Volume 2 Wholesale Local Access Market Review' consultation).

d. Impact of Service Maintenance Level (SMLs)

180. As previously stated, Openreach is committed to increasing the levels of service that we deliver to industry. Customers and CPs value service and we recognise Ofcom's commentary to this effect. For example in paragraph 3.37 of the Consultation Document "*…when choosing a broadband provider, reliability was the third most important factor for residential customers… and was the second most important factor for small and medium sized enterprises. Harm to retail competition may occur if customers who have experienced an Openreach fault decide to switch based on the mistaken belief that the fault would not have occurred with another telecoms provider*").

181. Based on this competitive value of service and the current small price differential between MPF SML1 and SML2[74], it would seem that there is a high probability that CPs could switch more lines to SML2 (for both MPF and WLR) at some point before or within the next Charge Control period (2018/19 to 2020/21). The recent moves in SML from our biggest three CPs demonstrated that this is now a key part of the toolkit for refining the propositions that they offer to their customers. However, unlike many of other product movements (e.g. migrations between products), SML changes can impact millions of lines within a very short time. For example, during 2016/17, we saw the SML change on 16M lines within a period of just 26 weeks. For one major CP's changes, we had only 8-9 weeks' notice before commencement of migrations, which created a very significant step change in the profile of the services that we had to deliver. The impact of this was further amplified by the fact that the CP had a highly non-uniform distribution of customers across our SOM and GM patches, thereby creating multiple hot-spots where we had to significantly change our resourcing approach/levels within these very challenging timescales.

182. We are fully committed to providing our CPs with as much choice and flexibility as is feasible. We believe that the market should retain the current levels of flexibility wherever possible, and therefore the only limitation that we are recommending is a 6 month notice period for bulk SML changes. We believe that the regulatory framework should not have extreme assumptions on the future mix of SMLs hard-wired into it (as that would result in a market that could move no faster than the regulatory process, with all of the consideration and consultation that this implies). The importance

73 See Openreach's response to Ofcom's 'Volume 2 Wholesale Local Access Market Review' Consultation

74 Openreach price list

of this is amplified by the high level of uncertainty around how these choice of SMLs will change in the future – today, we cannot (and should not attempt to) second-guess our CPs' commercial decisions across the period of this Charge Control (i.e. to 2020/21).

183. Whilst it is tempting to think that we could address the issues identified in Paragraph 181 by defining different MSLs for each SML, this fails to recognise the impact of two key factors:
    - **Geotype:** It is typically easier to deliver higher levels of service in urban/suburban patches (c.f. rural areas). To reflect this, the service targets would need to be different for different geotypes.
    - **Mix of Service Levels:** In practice, it is much easier to deliver a high service level for SML2 in an area dominated by SML1 (as the bulk of the SML1 lines effectively provide the flexibility to give the SML2 lines preferential treatment). Conversely, in an area dominated by SML2, flexibility is greatly reduced.

184. Consequently, a scheme that could genuinely support unfettered flexibility for CPs would have to be built upon a matrix of geotype and mix. The complexity associated with developing and maintaining such a scheme does not seem proportionate to the benefits that it would deliver. **Openreach therefore supports Ofcom's proposal to have an MSL shared by both SML1 and SML2.**

e. Matters beyond our Reasonable Control (MBORC)

185. The allowances made for MBORC are critical to the viability of the proposed MSL regime. In our previous FAMR submission, we demonstrated that a 6% allowance was the most appropriate value (given the ~8% impact experienced in the preceding years). Our latest position, backed up by the evidence of recent years, is presented in detail in our answer to question 5.6: In summary, the data shows that a higher MBORC allowance would be more appropriate given the history seen, which suggests that in particular years MBORCs can be as high as 5%. However if this is not acceptable to Ofcom, at the very least we believe that we need more flexibility around exemptions for high level events. If these MBORC recommendations are not adopted, we would welcome the opportunity to discuss a corresponding reduction in the MSLs.

f. Fault Volume Reduction (FVR) plans

186. Ofcom stresses the importance of FVR in achieving the proposed levels of service and we fully support this view. However, we will only be able to gain the necessary benefits from our FVR investments in the second half of the Charge Control period if we have sufficient flexibility within the first half of the period to make the investments in network health for which both Ofcom and Openreach have indicated strong support. In practice, this will largely be dictated by the level of the MSLs in years 1 and 2 – if they are too high, we will not be able to dedicate sufficient resource to FVR. **So, in summary, our ability to deliver against a higher MSL in year 3 of the Charge Control is critically dependent on the levels set for Years 1 and 2 not being set so high that we cannot properly resource our FVR programme.** This issue is discussed in detail in our response to question 5.4 below.

g. Recruitment and upskilling timescales

187. As outlined above, our ability to successfully execute FVR in the first half of the Charge Control period is critical to our ability to deliver significantly higher service levels in the second half. To

achieve this, it is essential that we recruit, upskill and buddy sufficient additional engineering resource during the first half of the period. This places further strain on our organisation – we need to have sufficient resource available to train and buddy our new engineers as they progress along their journey to full competence (currently 6 to 11 months, although this is expected to increase if we also start to train new recruits in advanced underground repair skills). This makes the MSLs for Years 1 and 2 of the Charge Control period absolutely critical – if the MSL increases too far too soon, we will not be able to set ourselves up with the skilled resources needed to meet the increasingly challenging service levels in Year 3 (see our answer to question 5.4 for further detail).

h. Unintended impact on Network Health beyond this Charge Control

188. The point raised in paragraph 186 above also applies to Year 3 of the Charge Control in terms of the impact that the MSLs will have on our ability to be able to continue with our significant investments in FVR: if MSLs are too high, we will not have the capability to deliver our planned levels of FVR. We believe it is more important for Openreach to continue to invest in the fundamental reliability of its network, as compared to a small incremental gain in on-time repair performance. The view from customers is demonstrated by the study that Ofcom commissioned for its consultation document[75]: when asked about the factors that influenced a customer's choice of broadband provider, the following results were obtained:
    - **Reliability:** 30% (Residential) & 20% (SME)
    - **Responsiveness to Faults:** 1% (Residential) & 3% (SME)

189. Customers' preference is therefore for *reliability* over *responsiveness to faults* which, translated into the decisions facing Ofcom and Openreach, is effectively for *FVR* over incremental gains in *on-time repair*. So, whilst Openreach remains committed to delivery higher levels of on-time success, the "*voice of the customer*" is very clear that this should not be at the expense of FVR.

i. On-time measure issues

190. As outlined in above, there is currently an issue with the way that the on-time measure treats *No Access* on unappointed faults. We would welcome the opportunity to work with Ofcom to correct this anomaly as quickly as possible.

191. In addition to the *No Access* point, our current ability to deliver on-time success is negatively impacted by the CP *Clear Reject* process. This process (only available on NGA and WLR3) enables a CP to reject our fault clears without the need to demonstrate that there is still an issue and, of particular importance to on-time MSLs, we do not get any additional time to investigate the issues that they raise. By contrast, where a CP submits a repeat report they will run through a new qualification process, thereby ensuring optimal routing of the fault. Clear Rejects have no such requirements for testing or qualification and there is no limit to the repetitions of this process. This therefore represents a significant vulnerability where a CP could impact Openreach MSL performance by simply repeatedly rejecting cleared Repair jobs.

192. Clear Rejects are primarily driven by CP retesting on closure, generally an automated process which does not account for conditions identified in the initial visit as linked to CP or end customer equipment/wiring. In addition, clears may be rejected where the CP cannot confirm resolution of the initial issue with their customer. Where the Openreach engineer has established the service as

[75] QoS Consultation Document - Figure 3.2: 2017 Jigsaw survey – main factors that influenced choice of broadband provider (Slide 18 for residential and Slide 76 for SMEs)

working correctly, or the issue is outside Openreach remit to resolve, notes will have been added to the closure highlighting this. However, auto testing and non-response returns will not account for this.

193. Whilst CPs are not currently abusing the process in a systematic way, the lack of input criteria around Clear Rejects does cause significant issues today. Openreach receives over 135k Clear Rejects per year of which 43% are subsequently closed outside the remit of Openreach (customer domain/equipment/Right When Tested), therefore we see a poor customer experience where this simply repeats the initial visit outcome, and we risk failing our SLA through re-visiting unnecessarily within the original allotted time. Of the 57% closed in the Openreach domain there will also be a volume of unnecessary interventions where the engineer may change or uplift a network component based on revisiting a customer, with the potential to negatively impact service where that customer will not be expecting or requiring a second visit.

194. WLR has the largest Clear Reject volume today and as a result its on-time performance is impacted significantly by this issue. As an example, in Q4 2016/17 3.7% of our clears were rejected by CPs[76]: faults that were not rejected had 83.3% on-time success whereas rejected clears were driven down to 58.7% success (i.e. circa 25 percentage points down). The impact of this was to drag our overall on-time success rate down by 0.9% to 82.4%. In a future where we need to consistently deliver c.90% on-time performance, this becomes significant. Currently, we do get some limited exemptions for Clear Rejects – these are supposed to trap the occasions when the fault is eventually cleared beyond the Openreach domain but in reality they 'miss' a number of high-volume cases. We would welcome further discussion with Ofcom on this area.

195. There are various options for addressing this issue, including:

- **Removal of the Clear Reject option from those products that currently include this capability:** Instead of a Clear Reject, a Repeat Report is raised which ensures that the fault is re-submitted with a more complete set of data points and diagnostics (thereby making sure that Openreach is equipped to handle the returned fault correctly). Openreach would recommend this option to enable a faster resolution for the customer.

- **Restrict Clear Reject submission to only those circuits with a faulty line condition:** Openreach could resolve any outstanding fault condition within the initial SLA, however where the line tests OK on closure the CP would need to follow existing channels to ensure the correct product is chosen for progression. However there may still be line conditions applied by customer CPE which appear to show a fault and the engineer's notes will have highlighted this to the CP, therefore the risk remains with Openreach.

- **CPs switch off auto-testing and check any suspect cleared tasks for explanatory notes before rejecting:** Clear Rejects could be effectively filtered and only those requiring Openreach management will be returned within the initial SLA.
- **Openreach considers that the current definition of SML2 "*next working day*" should be reviewed** in line with the accepted definition for this across most industries[77] which is that any request made ***during one working day*** (be that an order for a product, request for service or reporting an issue) will be resolved ***during the next working day***. This is not the

76 Source: Analysis of RD3 data: Q4 2016/17 (Product = WLR3; Sub-product = PSTN; CL = 1 and 2).
77 E.g. https://business.help.royalmail.com/app/answers/detail/a_id/927;

regime used in the definition of SML2. Instead, any fault received up to midnight of the day before is considered to have been received during that working day. We identified this as an issue in our last FAMR response, making the following point: "*Although such a change would need to be agreed via contract discussions, we look to Ofcom to signal its support for a 6pm cut off for Care Level 2 products*". *It should be noted that the UK approach differs from that taken in most other European countries*[78] where time limits are applied – either by refusing to accept the fault report at all (which we do not believe is optimum) or by associating evening faults with the next working day (our preferred approach). The impact of evening faults will become increasingly significant as we push our service delivery up to circa 90%. Using 2016/17 Q4 as an example, 18% of our SML2 faults were received beyond 6 pm and these had an on-time success rate that was on average 2.7% worse than faults received earlier in the day. The combined impact of this is to reduce our overall SML2 performance by 0.5%.

j. Delivering Value for Money

196. Market feedback as identified in the Consultation Document is that a balanced response is required, delivering *value for money*. This requires a MSL that is *proportionate* to the nuanced demands of the market (improved service, but not at any cost). This is borne out by the research commissioned by Ofcom as shown in Figure 3.2 from the Consultation Document - reproduced as Figure 24.

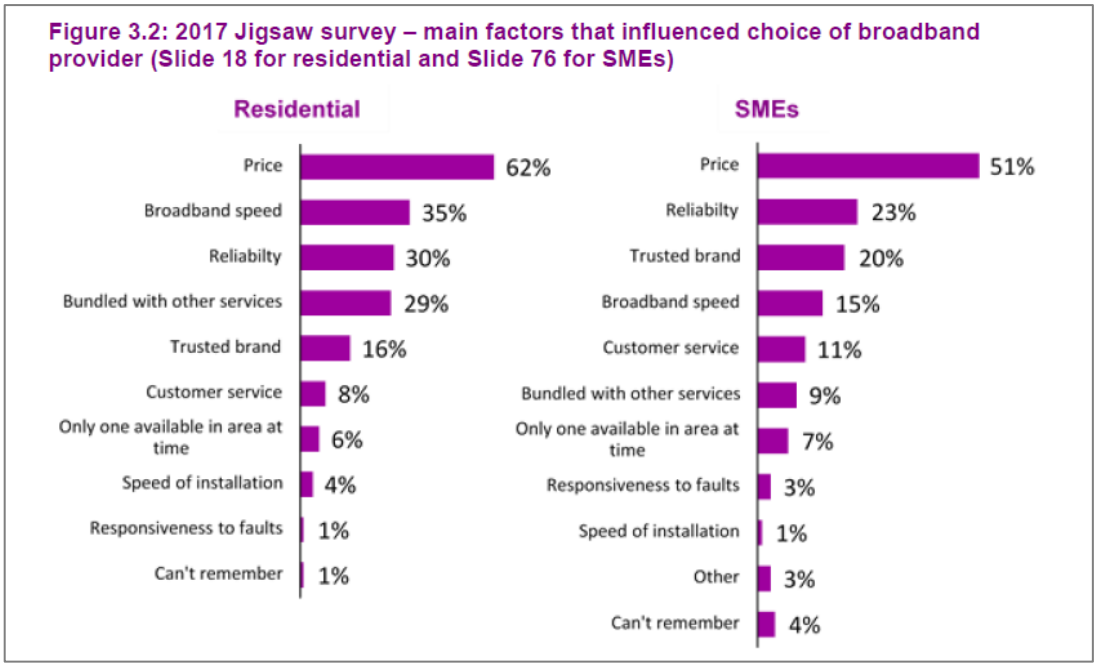


Figure 24: Copy of Ofcom Figure 3.2[79]

197. This research indicates that customers value price above all else. This is an important point to balance against Ofcom and Openreach's shared desire to drive up service – when we reach the point of diminishing returns, continuing to invest for limited incremental gain does not align with the wishes of our customers. Openreach has had similar feedback via its engagements with industry: as described earlier in our response, in 2016/17 we proposed some changes to industry that would deliver an uplift in on-time service by appointing an additional 3% of faults that fell on the boundary

[78] Cullen "Service Levels – Repair" CTTEEU20170033 - April 1, 2017
[79] Jigsaw (Figure 3.2 in Ofcom: "Quality of Service Remedies")

of in-home/network. This proposal was rejected by CPs – citing the negative impact on customers and on the CPs' own resources of having more appointments. This is a very specific demonstration of how the industry does not want service at any cost.

198. In our answer to question 8.2, we provide extensive details around the results of our simulations of the trade-off between delivered service and required resource. This demonstrates that we start to deliver diminishing returns if we try to deliver service at levels beyond 90% (87% post MBORC allowance).

j. Geographical variations

199. Unlike some other industries where operations can be centralised to improve service consistency and optimise efficiency, our field engineering effort is – by definition – an activity whose footprint has to encompass every home and business within the UK. As a result, the geographical nuances and historical local decisions of every patch have an impact on the pace and scale of the performance uplifts that we can deliver e.g.:

- our ability to get engineers (and their vans) to small islands will always place a ceiling on our performance on impacted patches, especially as the weather conditions most likely to generate faults are the same conditions most likely to cause ferry crossings to be cancelled;
- Localised flooding can isolate very specific areas and drive a sharp increase in faults reported; and
- Some areas have historically posed significant recruitment problems (e.g. Aberdeen, given the competition for engineers from oil-related industries).

200. Some specific extremes events will be covered by High Level MBORC provisions but, for the vast majority of patches in the vast majority of weeks, we will be required to simply absorb the day-to-day variation in demand, whilst still exceeding ever more demanding MSLs. Whilst we do all we can to cater for these variations, they still impose an unavoidable bandwidth on our results from patch-to-patch (see Figure 25 below) – with the variation of Glass Ceiling highlighted above being one specific example of this. Even assuming that the High Level MBORC exceptions could exclude the variations from two patches, our third worst patch (when ranking in terms of biggest gap to national average across SML1 and SML2) is still 1.5% points below the national average. Given the huge variety of actions that we took in 2016/17 to avoid local degradation of service, we believe that this therefore represents an optimistic benchmark for enduring geographical variation between patches.

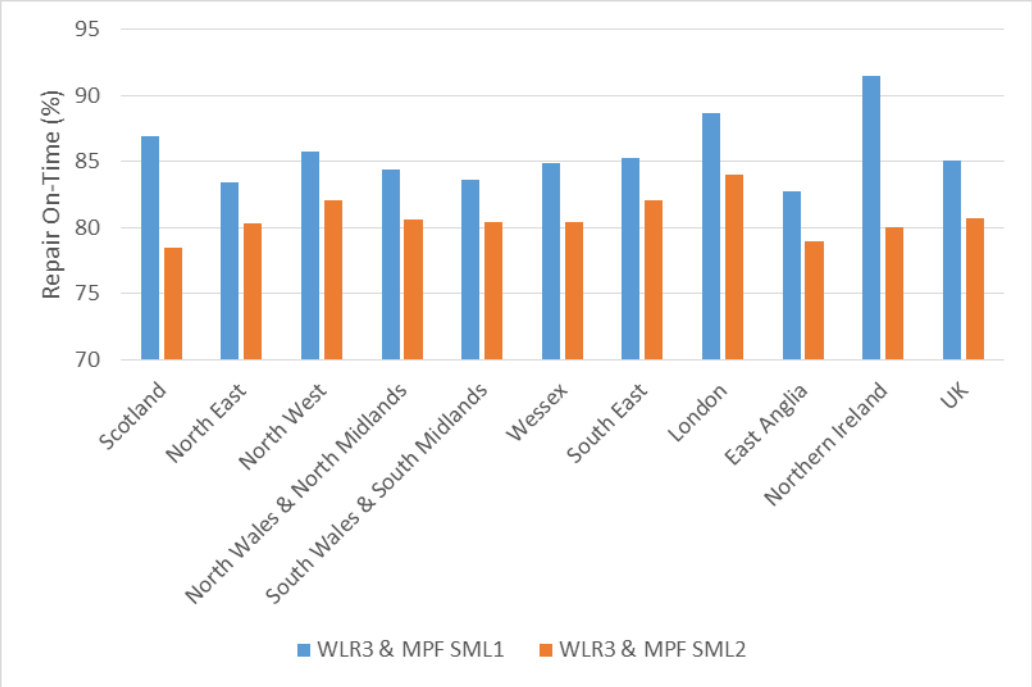


Figure 25: Geographical Variation in Repair On-Time Performance (16/17)[80]

Openreach's Proposal for the Revised Repair Service Level

201. Ofcom proposes a final year repair Minimum Service Level of 93% (90% post MBORC allowance). Ofcom suggests this level is objectively justifiable because it is achievable, and it strikes the right balance between consumer expectations and the risk that retail prices might increase[81].

202. As demonstrated by the factors highlighted above, this proposed level is not achievable as a minimum service level that has to be met in every geographical area, considering the proximity of the supposedly minimum level to the maximum level imposed by the glass ceiling, the dynamic nature of the UK market, the issues with the current measure set and how little anyone can really know about how the industry will look in 2020/21. Further, we disagree that the right balance is being struck, this is particularly so given that Ofcom's own research suggests that consumers value lower prices more than higher service levels.[82] For these reasons, the current proposal for a 93% MSL in Year 3 is not objectively justifiable[83] nor, more broadly, reasonably necessary[84].

203. We are also concerned that the proposals are not proportionate[85]. Ofcom simply asserts that the proposals are proportionate, however it is not clear the basis on which this conclusion is reached. In light of the evidence in this submission on the unachieveability, cost and negative consequences of the proposed 93% MSL level, and the consumers' preferences for lower prices, we do not believe the proposals are proportionate. This is particularly so given that failure to comply with MSLs can have serious legal and financial repercussions.

[80] 647 MSL Report archive
[81] Paragraph 5.59 of the Consultation Document
[82] See, for example, paragraph 197 above.
[83] The Act, section 47
[84] The Act, section 6(1)
[85] The Act, section 47

204. Openreach proposes a MSL of 90% (87% post MBORC allowance), contingent on the on-time measures being revised to address our concerns around "unappointed No Access" and "Clear Rejects". This will require us to reduce several of the components within the glass ceiling but we will back ourselves to do this early in the Charge Control period (before the targets become too high).

205. Amending the MSLs in line with our proposal would also address our concerns about proportionality.[86]

Openreach's response to Ofcom's proposed repair tail (SLA+5 working days) standards

206. **As mentioned in our response to Question 5.1:** Given our strong performance in this regard, and noting that Section 47 of the Communications Act requires that Ofcom only impose such conditions where it is satisfied that they are objectively justifiable, there does not appear to be sufficient justification[87] for the introduction of further regulation (MSLs) to address "SLA+5 working days" repair tails. Also, it is difficult to see how this proposal is reasonably necessary and consistent with Ofcom's requirement not to impose unnecessary regulatory burdens[88].

207. **If Ofcom introduces a further MSL to cover repair tails, we believe that the 97% Year 3 value proposed is acceptable**: Figure 26 (below) shows that we have managed to deliver at this level during various periods.

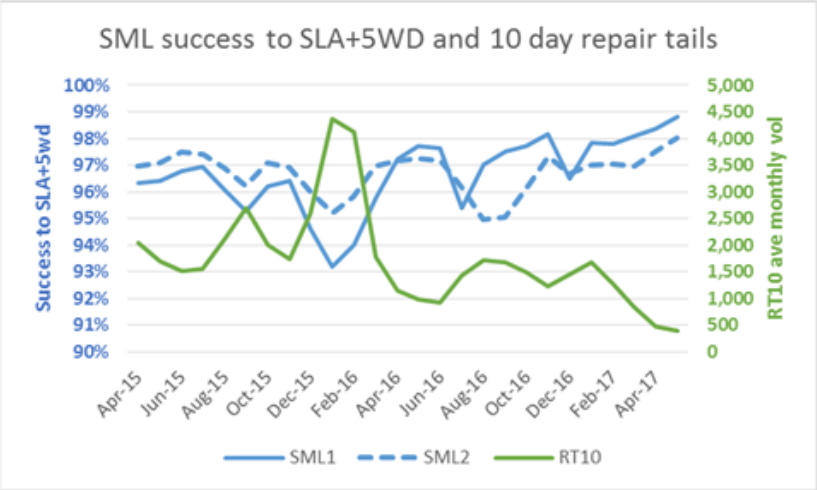


Figure 26: Openreach Repair Tails Performance[89]

Question 5.4: Do you agree with our proposed glidepaths? Please provide reasons and evidence in support of your views.

[86] Ofcom should, as part of its statutory requirement to undertake an impact assessment, evaluate this as an alternative option (the Act, section 7 and Better Policy making; Ofcom's approach to Impact Assessment). To this end, Openreach observes that this option has not been considered as part of that impact assessment to date.
[87] The Act, section 47
[88] The Act, section 6
[89] Service Insight analysis of data from 524 (Tails) and 647 (MSL) reports

208. We agree with Ofcom that it is appropriate to use a glidepath, because as acknowledged by Ofcom, (Consultation Document paragraphs 5.67 and 5.68) there is a time lag between investing in improvements to repair delivery and those improvements being realised. However, we do not agree with Ofcom's proposed glidepath because, as we outline below, the 7% increase from Year 1 to Year 2 will require a level of recruitment and training that is above anything undertaken previously. We would need to scale the recruitment and training capability to manage this, but in addition the operational impact of successfully landing this level of change across the workforce, whilst supporting recruits and experienced engineers with new skills as they embed new capabilities and processes, would stretch our operational capability to the limit.

209. We propose that the following glidepath is more appropriate[90], if Ofcom accepts our proposal for 90% (pre MBORC allowance) in Year 3:

- Year 1: 83% (80% post MBORC allowance)
- Year 2: 87% (84% post MBORC allowance)
- Year 3: 90% (87% post MBORC allowance)

210. There is an unavoidable lead time to recruit and train new engineers and there is an inherent 'time to competence' for any new recruit or upskilled engineer which means that to achieve the service level in Year 1, 2 or 3 the operational teams need to make informed decisions at least one year ahead. The recruits that are joining Openreach this year and the upskilling we are doing, will underpin the service performance delivered in 2018/19, Year 1 of the Charge Control. Our business plans for this year were set almost 6 months ago, including budgets for training etc. We have made recruitment and training plans based on our objective to continue to improve service levels as we move into Year 1 of the Charge Control period and so believe the proposed 83% MSL is reasonable. As it takes around 12 months for a newly trained engineer to achieve comparable capability to an existing engineer, there is significant risk associated with trying to achieve too great a step change in the glidepath too early in the Charge Control.

211. To develop our response on whether Openreach agrees with the proposed glidepath, we have placed reliance on our understanding of (i) the underlying drivers of the glass ceiling on repair performance and whether they are addressable (ii) the output of the Allocation Model that we have built in conjunction with EY and (iii) our knowledge of the operational and other challenges that may impact the pace at which any improvement glidepath can be achieved.

212. Given the evidence provided in our response to Question 5.3, we feel that there is a need to consider a revised glidepath. We believe that the Year 3 MSL of 93% does not represent a reasonable MSL at a national level and instead represents an aspirational target. In several geographies we believe there is significant evidence to suggest it would not be possible to achieve that level of performance on a consistent basis and there is a need to move forward with a pan industry discussion on specific areas that influence the glass ceiling or the measurement methodology for the MSL performance.

213. We share Ofcom's ambition to continue to improve the quality of service provided by the industry to

90 It would also address our concerns about the proportionality (the Act, section 47) of the glidepath as it would take into adequate account time lag issues and therefore be achievable.

consumers. We recognise that as part of this we need to continue to invest to address the causes of failure that are within Openreach control and work alongside industry and the OTA2 where solutions require collaboration. We believe the evidence now presented suggests that achieving the current glidepath in Year 3 requires Openreach to remove all of the failure that might be considered within its control. In some geographies even eliminating all failure that is with Openreach control may not enable us to achieve what is currently defined as a minimum target.

214. To inform our understanding of the resourcing and skilling activity we would need to undertake to achieve the glidepath we have used the Allocation Model. The Allocation Model has been built by EY to better inform our operational understanding of the resourcing and skilling requirements to deliver improving service levels in a range of scenarios. We provide a detailed explanation of the Allocation Model and comparison to the Ofcom Resource Performance Model in our response to question 8.2 (and see associated Annex).

215. We do not consider that applying a 50/50 mix accurately reflects the impact of the SML mix in achieving the minimum service levels. In reality, the mix will vary significantly by line type and location in a way that impacts the operational requirements to successfully deliver to the customer. As such, we feel that applying the actual 2016/17 CP level mix back across previous years provides a more reliable indication of the resource needed to deliver the required service levels in the geographical locations.

216. In addition, we do not believe it is practical or effective to have a workforce that is 100% multi-skilled. There will always be a career path within the engineering workforce where new recruits join the business and are trained to undertake provision and simple repair activity. As they gain experience and achieve comparable competence (no sooner than 11 months) they may be given the opportunity to develop new complex underground repair and broadband skills. Over and above the recent recruits, there will also be a number of engineers who do not wish to develop their career in this way.

217. Finally we have reviewed the proposed glidepath in the context of the operational recruitment and training implications, whether it is achievable and the associated investment required. We have invested significantly in recruitment and training over recent years to meet and exceed the current MSLs. This investment was made with the ambition to continue to improve the service we provide and to exceed the minimum levels set by Ofcom. This investment is over and above the business as usual 2015/16 base year activity and will flow through into the cost base across the whole period of the charge control. It will be key to help us achieve the step change in performance that is required in the years covered by the proposed glidepath.

218. There are costs associated with delivering the recruitment required (e.g., hubs, trainers, coaches etc.) There are also the operational costs associated with the reduction on field engineering capacity as existing engineers "buddy" their new colleagues to embed skills and the productivity drag as recruits move through the inevitable time to competence curve to achieve a level of productivity that is comparable to their more experienced colleagues.

219. Between 2016/17 and 2017/18 we expect to have recruited c. [✂] engineers ahead of entering the Charge Control period. This represents a net increase of c. [✂] engineers above the 2015/16 base year. The Allocation Model suggests that to achieve a single year step of 7% to the 90% proposed service performance in Year 2, we would need to recruit over [✂] engineers in a single year (over [✂] net uplift) and upskill over [✂] engineers to

be able to carry out underground (UG) repair. This level of recruitment and skilling is far in excess of anything that we have previously achieved in a single year. It would require a step up in recruitment and training capability, but more importantly would require significant support from our experienced engineering resource to support the buddying etc. needed. We believe this represents a significant delivery risk and do not feel this uncertainty is in the interests of industry or customers. We therefore propose a more gradual glidepath in Year 2 and 3 to 87% and then 90%.

220. The additional cost associated with the increased level of resource achieve 93% on time performance has not been fully funded within the current Ofcom modelling. We provide more detailed analysis and explanation in our response to question 8.2, but the Allocation Model output suggests that we would need over 47% uplift in capacity to approach 93% service performance. Based on this, we estimate that the additional recruitment and upskilling cost is £[✂]m over the charge control period, compared to the current Ofcom modelling allowance of c. £30m and we would therefore be under-funded by £[✂]m. This figure does not include the investments made in 2016/17 and 2017/18 that we expect to be captured when Ofcom update to the 2016/17 base year.

221. Of the investment needed to support the glidepath outlined above, the Ofcom modelling approach suggests that the additional cost allowance of the 47% uplift is £[✂]m. This does not include a further £[✂]m across the Charge Control period that is driven by the lost capacity and productivity from these additional recruits (above the base 2015/16 period). Further to the recruitment costs above, there will also be costs from investment in training. We have invested in upskilling over [✂] engineers to Underground repair in 2016/17 (c. [✂] engineers above the level undertaken in 2015/16) and are aiming to upskill a further c . [✂] in 2017/18. This has been done as an enabler to underpin our objective of improving service levels as we enter the new charge control period. However, to achieve the level of multi-skilling assumed in the Allocation Model analysis will require a further c. [✂] engineers to be upskilled to Underground repair, which is c. [✂] more than running at 2015/16 levels. This incremental training has a cost of c. £[✂]m above 2015/16 within the charge control period and drives an additional £[✂]m of lost capacity and reduced productivity across the charge control period. These training costs are an essential element of achieving the glidepaths proposed, but given the assumption in the current Ofcom modelling that every engineer can do anything, we do not believe that these costs have been accounted for anywhere in the analysis.

222. In summary, we support the aspiration to achieve levels of service in the order of those outlined in the Openreach's proposed glidepath. However, we believe that our analysis of the performance glass ceiling shows that this will require agreement to changes in the way we manage repair activity across the industry and potential adjustments to the way we measure the targets. Even after these changes, we believe that in some patches the final year target will represent the maximum achievable service level, requiring Openreach to remove all failure that is within its control every single day, rather than a minimum than we continue to aim to exceed.

223. Consequently, we propose the following glidepath: Year 1: 83% (80% post MBORC allowance); Year 2: 87% (84% post MBORC allowance); Year 3: 90% (87% post MBORC allowance). If this glidepath is agreed then it should be noted that the investment costs outlined above will fall as less of a resource uplift and associated upskilling will be required and this is outlined in more detail in our response to Question 8.2. We believe a more even glidepath will enable a smoother transition to the Year 3 MSL and would better take into account the issues identified above, including the time

lag. This smoother glidepath would therefore assist in ensuring the MSLs are proportionate[91]

Openreach's response to Ofcom's proposed glidepath for the repair tail (SLA+5 working days) MSL

224. Whilst we do not consider that a repair tail MSL is required, if Ofcom chooses to introduce this, we believe that the linear glidepath proposed by Ofcom (Year 1:95%; Year 2: 96%; Year 3: 97%) is reasonable.

Question 5.5: Do you agree with our proposed compliance periods and geographic applications of the repair standards? Please provide reasons and evidence in support of your views.

225. We broadly agree with Ofcom's proposals. The compliance period of one year allows for the impact of any poor weather over the winter months to be mitigated in the spring/summer. A reduction in the compliance period would lead to higher cost as Openreach would need to over-spend either to build up a mitigating buffer more quickly, or be forced to deliver higher than practical performance in poor winter conditions.

226. Openreach agrees that 10 geographical areas is the correct level of granularity for the main MSLs. Moving to the next level down (56 areas) would mean that a significant extended weather event (where we could not use a High-Level MBORC exception), or a large physical network event would take many weeks or months to recover through over-delivery of performance at significant extra cost.

227. For operational reasons, we may occasionally change our GM structure to optimise our operational performance (e.g. the recent splitting of Wessex into two GM areas) but we do not believe that any such changes should be flowed through into MSLs. However, where there are movements of small areas between GM patches, we believe that it is appropriate to reflect the updated structure in our MSL reporting (as the alternative is to maintain a potentially meaningless "*shadow*" organisational structure for the sole purpose of providing MSL results). To reflect recent changes, this would require moving Bristol into the Wessex area, and Romford into the London area.

228. If, Ofcom introduces a further MSL to cover "SLA+5 working days" repair tails, the application of this MSL at a national level is reasonable as failures are materially lower and as such would lead to a higher level of volatility at a more granular level.

[91] In addition, Ofcom should, as part of its statutory requirement to undertake an impact assessment, evaluate this as an alternative option (see the Act, section 7 and Better Policy in Making; Ofcom's approach to Impact Assessment).

Question 5.6: Do you agree with our proposal to continue to make an allowance for force majeure in the repair QoS standards? Do you agree with our proposals to use 3% as the Local MBORC allowance and to retain exemptions for High Level events? Please provide reasons and evidence in support of your views.

229. We agree with Ofcom's proposal to continue to make an allowance for MBORC. We believe that a higher MBORC allowance would be more appropriate given historic data, which suggest that in particular years MBORCs can be as high as 5%. However, if this is not acceptable to Ofcom, at the very least, we believe that we need more flexibility around exemptions for high level events. We expand on these points below.

230. It is essential that the MBORC allowances remain in place as these events are outside the control of Openreach. Any reduction in the allowance would change significantly our understanding of the cost in delivering the service levels, especially in Years 2 and 3.

231. We have made improvements in our data gathering with regards to MBORC impacted failure, giving the view of volumes shown in Figure 27 [92] below. This is higher than the data shown in the 2014 FAMR, where 2012/13 MBORC was shown to be 5%/3% rather than the 9%/5% shown. Based on Ofcom's statement in the Consultation Document that MBORC should account for the worst case scenario (section 5.86), this analysis suggests that a 5% allowance would be more appropriate.

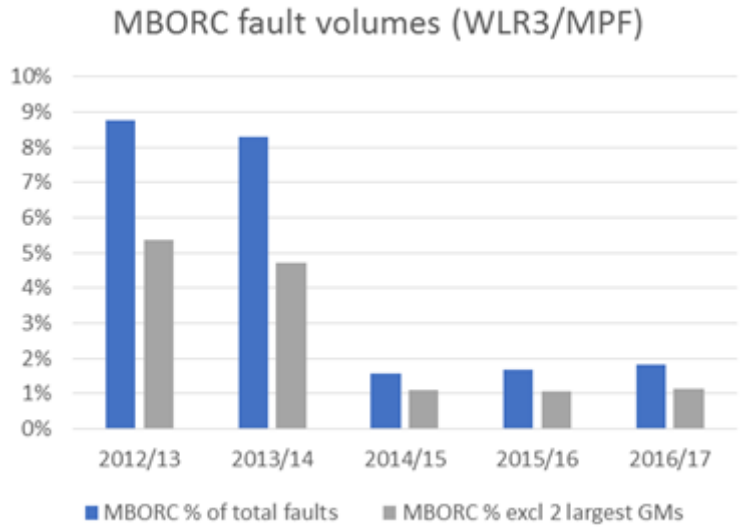


Figure 27 - MBORC Fault Volumes (WLR3/MPF)[93]

232. MBORC volumes have been relatively low for the past three years, despite 2015/16 being the third wettest in twenty years (2012 was the wettest). However, it is how and where the rain falls across the UK (and if we have a particularly bad lightning season) that will influence the usage of MBORC. It would be expected that at least one year out of the three year period will see very challenging weather.

233. The increase in service levels over the coming three years sees the total allowable failure (pre MBORC allowance) reduce from 30% in 2014/15 to 7% in 2020/21. When the MSL was 70% in year 1, and even the 80% we have in year 3, this allowed Openreach the opportunity to over-deliver if an affected area saw more than a 3% impact from MBORC in a given period. With the higher

[92] Service Insight analysis of MBORC data analysis using RD3 and CPIS data; Mar-17.
[93] Service Insight analysis of MBORC data analysis using RD3 and CPIS data; Mar-17.

MSLs being proposed 'over-delivery' will be much less practical, so it is essential Openreach is given the framework and allowances to fully compensate regulated performance for events out of their control.

234. Our latest analysis suggests that an MBORC allowance of 5% would be appropriate. If, notwithstanding this analysis, Ofcom only make a 3% allowance for MBORC, in order to take into account the risk of higher MBORCs in particular year, at the very least the current limitation on High Level MBORC declarations should be removed, i.e. this should no longer be constrained to just 2 GM patches, with additional declarations being considered on case-by-case basis, overseen by Ofcom to ensure that industry has confidence in the process[94].

235. As MBORC events are outside of Openreach's control, the consequence of insufficient allowance for MBORC will raise implications not least publically where Openreach could be seen to fail through no fault of its own. It is essential that the exemptions for high level events remains or are extended, else it would lead to a need for an even higher low level allowance than the 5% Openreach believe is appropriate. The restriction of 8 weeks per event is reasonable, and allows time for Openreach to recover from the most extreme events.

236. For repair standards at "SLA+5 working days", we agree that the exceptions for High Level MBORCs are appropriate (although, as mentioned previously, we do not believe that the introduction of this additional set of MSLs is justified).

Question 5.7: Do you agree with our proposal to make the payment period for late repair SLGs indefinite? Please provide reasons and evidence in support of your views

237. Openreach does not agree with Ofcom's proposal to make the payment period for late SLGs indefinite.

238. It is normal commercial practice to include a cap on compensation payments in any SLA contained within a commercial contract so that liability is not open ended or unlimited. As noted by Ofcom[95], caps also apply in certain circumstances in the electricity and gas sectors.

239. Notwithstanding the above, our WLR, LLU and NGA contracts contain provisions which allow the CPs to claim for additional financial loss associated with specific breaches beyond the level of the cap contained within the SLAs. Therefore we believe that CPs already have a mechanism to make claims where they are above the relevant SLG cap. Ofcom's assessment does not take this factor into account.

240. Ofcom considered removing the cap on compensation in 2008, in its review of BT's SLGs, but on balance decided not to do so because it recognised that the absence of caps can create uncertainty. Ofcom specifically stated that it "*acknowledges that caps limiting exposure to*

94 We consider that if this limitation is not removed, then this proposal would be disproportionate and unreasonable as Openreach could be liable as a result of factors it is unable to control. This would be unfair. In addition, Ofcom should, as part of its statutory requirement to undertake an impact assessment, evaluate this as an alternative option (the Act, section 7 and Better Policy Making; Ofcom's approach to impact assessment).

95 https://www.ofcom.org.uk/consultations-and-statements/category-1/automatic-compensation paragraph 8.21

compensation – even set at a level where they are unlikely to bite – aid certainty and provide a level of transparency to both parties subject to the contract[96]". Ofcom was also mindful at the time of not introducing unreasonable burdens on Openreach[97].

241. There have been no significant changes since then to warrant a change in approach now. If anything, recent developments suggest that there is now even less justification for imposing indefinite liability in SLGs as Openreach has made a public commitment to eradicate any tails longer than 30 days past SLA by the end of June 2017, and current performance shows the success in achieving this (see Figure 28 below[98]).

242. Further, we do not agree with the reasons for removing the cap as set out in the Consultation Document. First, Ofcom suggests that currently there is no financial incentive for Openreach to complete repairs beyond the 60 days. However, the existing contractual provisions do provide such financial incentive. Second, Ofcom suggests the cap needs to be removed because it "*risks undermining the SLA/SLG regime as a component of fair and reasonable network access*"[99]. There is no evidence to support this. Indeed, Openreach's recent performance, in particular the improvement in repair tails, clearly demonstrates that Openreach must have an incentive to reduce repair tails and is already acting on that incentive.[100]

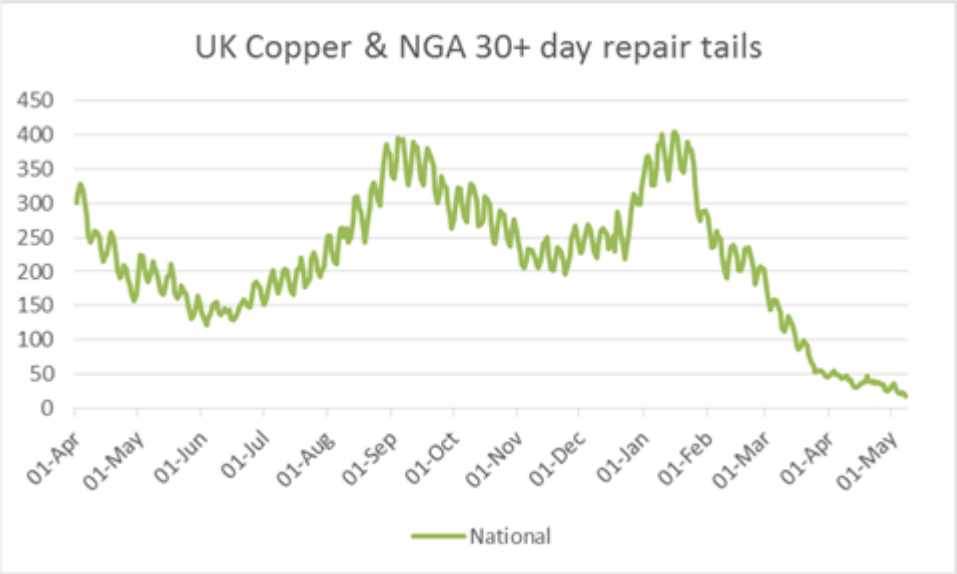


Figure 28: UK Copper and NGA 30+ Day Repair Tails (1April 2016 – 1 May 2017) [101]

243. The number of faults that would be captured by this change is reducing rapidly as Openreach reduce the aged tail. In March 2017, less than 50 faults would have been impacted (as shown in

[96] https://www.ofcom.org.uk/__data/assets/pdf_file/0020/33617/statement.pdf paragraph 3.37
[97] https://www.ofcom.org.uk/__data/assets/pdf_file/0020/33617/statement.pdf paragraphs 4.21 and 5.22
[98] Openreach 524 tails report
[99] Consultation, paragraph 5.97.
[100] In addition, the general fair and reasonable terms and conditions obligation will continue to apply alongside the specific MSL and existing cap. This affords CPs protection.
[101] 524 Tails Report

Table 10 below).

Table 10: Recent 60-Day Repair Tail/SLG Data[102]

March 2017 MSL data	Base SLG (up to 60 days)	Extra SLG (over 60 days)	No of faults
WLR3	**£430k**	**£3k**	**17**
LLU	**£209k**	**£2k**	**7**
GEA	**£122k**	**£9k**	**18**
Total	**£761k**	**£14k**	**42**

*SLG values are estimated as based on service data

244. With an expectation of zero tails beyond 30 days from July 2017, no faults would fall in the scope of this change by the time it is introduced.

245. Against this background, we do not believe there is an objective justification[103] for this proposal: it is also not reasonably necessary[104].

Question 5.8: Do you have any further comments on our proposals for regulating BT's service performance for repairs? Please provide reasons and evidence in support of your views.

246. Openreach is fully committed to improving the service that it delivers and shares Ofcom's vision of delivering on-time repair performance in excess of 90%. However, we believe that we need to make sure that we do not confuse the national target for service performance with the regulated Minimum Service Level (MSL), which has to be delivered in every region in every year, and for both SML1 and SML2.

247. Irrespective of the outcome of the Charge Control, we will be setting ourselves ambitious targets to significantly uplift the level of service that we deliver over the next 5 years. But given the dynamic and competitive nature of our industry, it would never be appropriate to have such ambitious targets "*hard-wired*" as regulated locally-measured minimum service levels. Below we summarise the key points that we have made on repair service levels in this document – we are not questioning Ofcom's vision and ambition for the industry but we are challenging the proposed level and pace of the regulated minimum service levels and the resource that we will need to deliver against these very demanding standards.

248. **Volume of demand:** Across the period of the Charge Control, the highly competitive nature of the UK telecommunications market and the introduction of new technologies will maintain the high level of provision demand that we will face. Our FVR programme will drive down the network fault rate but this will inevitably be a slow process (largely due to the scale of our network) and, despite our investments in advanced test and diagnostics, any reductions here are likely to be offset by increased demand for broadband/chargeable repair and the impact of increased intervention in our network. In totality, therefore, all of the scenarios that we can envisage have one thing in common – increasing demand for Openreach resources in the future (and this is before we even start to consider the impact of delivering increased levels of service). This is one of the reasons why we are

[102] RD3 MSL data, manual analysis
[103] The Act, section 47
[104] And, accordingly is an unnecessary regulatory burden (The Act, section 6)

investing so much time and effort in finding better ways to work with CPs – the structure of the UK telecommunications market means that delivering better service is a team game and we need to make sure that every part of the industry is playing its part in uplifting the service that customers receive.

249. **Level of resource required to deliver a step-change in service:** Our FVR programme throughout 2016/17 has taught us much about the challenges of investing at these increased levels and about the fault volume *headwinds* that we now face. As a result, we can see that the net benefits that we will get from FVR will be significantly less than that assumed by Ofcom – i.e. our fault volumes will not reduce at the scale and pace used in the Ofcom models. In parallel, we have worked with EY to develop a powerful simulation capability (the Allocation Model) which has enabled us to produce comprehensive and accurate estimates of the additional resource that we will need to uplift service in line with Ofcom and Openreach's shared aspirations. The net result of; (i) the FVR learning from 2015/16; (ii) our improved simulations of the resource required to deliver an uplift in service; and (iii) the increased total demand (see previous paragraph) is that we will need a significant amount of additional engineering resource across our organisation.

250. **Delivering a step-change in service in a highly efficient organisation:** The way that we would typically seek to mitigate the additional resource requirements highlighted in the previous paragraph is to deliver increased efficiency. Indeed, this is a key assumption that Ofcom makes, predicting that we will deliver 5.5% year-on-year opex efficiency (3% year-on-year capex efficiency). However, we have found that such levels of efficiency gain can no longer be delivered: (i) We are already a highly efficient organisation, as evidenced by our prices being lower than every other major European economy, thereby enabling UK CPs to take more margin from the value-chain than is available in another other European country (with the exception of Lithuania); (ii) There is a fundamental trade-off between service and efficiency – we understand the drivers behind this and saw clear evidence of this mechanism in action during 2016/17 when our 6% service uplift was achieved at a cost of an 11% increase in operating costs[105]. So, with rising demand and at best flat efficiency, the only way that we can deliver the required service uplift is to recruit significantly before and during the charge control period.

251. **Resource ramp-up:** The unavoidable recruitment described above brings its own challenges: every engineer will need to be selected, recruited, trained, buddied and fully equipped before they can start to add value. Furthermore, even when they start to contribute, we see a significant "*time to competence*" impact – much of what we ask our engineers to do is complex and challenging and it takes months (or even years) for our new recruits to master the full breadth of their roles. This end-to-end recruitment process adds significantly to the costs of what we have to do to deliver an uplift in service and sets a maximum pace for implementing the necessary changes.

252. **Value for money:** All of the above factors combine to give a distinct curve to the relationship between incremental cost and incremental improvements in the level of service delivered. As we approach 90% on-time repair (87% post MBORC allowance), we get diminishing returns (in terms of service uplift) for our incremental investments in resource.

253. **Measure changes:** Changing the nuances of how we define the on-time measure is key to delivering value for money. The occasions when we miss our on-time target because of a flaw in the

[105] Resource Dynamics analysis of Openreach Geo Tracker data

measure are *waste* in the process and applying more resource simply is not going to fix the problem. Instead, we should improve the measure to give a more accurate reflection of our performance.

6. Regulating BT's service performance for installations

Question 6.1: Do you agree with our proposals for on-time installation standards? Please provide reasons and evidence in support of your views.

254. We welcome the increasing service levels for installations outlined in the Consultation Document. This is an area where we have consistently out-performed the MSLs and have set ourselves challenging ambitions.

255. In the previous FAMR standards were introduced for on-time installations at 90% each year for the period of the review (2014-17). This meant a minimum of 90% of all orders to install WLR and MPF connections should be completed on the date agreed with the CP who ordered it.

256. In the period since the 2014 FAMR Statement Openreach performance has been significantly above the minimum 90% standard required, as shown in Table 11 below.

Table 11: Yearly On-Time Performance by GM Region[106]

	2012-13	2013-14	2014-15	2015-16	2016-17
East Anglia	93.7%	94.6%	94.8%	94.4%	93.8%
London	92.3%	92.5%	93.5%	93.3%	93.3%
NI	91.6%	92.0%	93.5%	93.7%	93.8%
North East	93.7%	92.1%	94.2%	93.4%	94.4%
North Wales & North Midlands	92.2%	92.6%	93.2%	93.3%	93.3%
North West	93.6%	93.1%	93.9%	93.4%	93.9%
Scotland	94.5%	93.6%	93.8%	93.1%	94.1%
South East	93.7%	93.6%	94.3%	94.5%	93.7%
South Wales & South Midlands	92.7%	92.6%	93.8%	93.6%	93.4%
Wessex	93.3%	93.5%	94.0%	93.6%	93.8%
Grand Total	93.2%	93.1%	93.9%	93.6%	93.8%

257. In September 2015 Openreach launched "Our Charter" where we made our public commitment to customers which were above and beyond the minimum standards in place at the time. The Charter stated "Ofcom minimum service level for regulated copper products is 89% on time installation. Our 2017 target is 95% for both copper and fibre". It should be noted that this commitment was for a UK wide result and not split by GM regions.

258. Openreach continues to exceed the current 2017-18 MSL and is striving to deliver the 95% commitment already made in the Openreach Charter. This is further evidence of Openreach considering MSLs as a minimum and not a target.

259. The start of 2017 has seen some GM patches exceed the 95% target for a spot month result (see Table 12 below). Plans are in place to deliver the 95% nationally as committed by the end of 2017

[106] **647 MSL Report Archive**

Table 12: 2016/17 Monthly On-Time Performance by GM Region[107]

	April	May	June	July	August	September	October	November	December	January	February	March
East Anglia	93.8%	92.9%	94.0%	94.1%	94.4%	93.8%	93.3%	93.1%	93.3%	94.2%	94.3%	94.5%
London	93.3%	93.5%	93.8%	94.1%	93.7%	92.7%	91.9%	92.7%	93.0%	93.6%	93.9%	93.5%
NI	93.3%	92.1%	92.7%	92.4%	94.1%	93.2%	93.6%	93.4%	94.6%	95.3%	95.3%	95.1%
North East	94.0%	92.8%	94.6%	94.8%	94.7%	94.7%	93.8%	94.2%	93.9%	94.7%	95.5%	95.0%
North Wales & North Midlands	93.1%	90.9%	93.0%	94.2%	93.7%	93.2%	93.3%	93.1%	92.6%	94.0%	94.2%	93.6%
North West	93.4%	92.4%	94.2%	94.5%	94.3%	94.0%	93.5%	93.6%	93.5%	94.3%	95.1%	94.1%
Scotland	93.7%	93.2%	93.6%	94.5%	93.8%	93.9%	94.0%	93.6%	93.7%	94.8%	95.0%	94.8%
South East	93.9%	91.2%	93.2%	94.3%	94.3%	93.8%	93.3%	93.6%	93.6%	93.9%	94.6%	94.5%
South Wales & South Midlands	93.5%	92.5%	93.7%	94.2%	94.0%	92.9%	92.9%	92.7%	92.9%	93.7%	94.3%	94.1%
Wessex	94.0%	93.0%	94.2%	94.5%	94.1%	93.0%	92.7%	93.3%	93.2%	94.5%	94.6%	94.6%
Grand Total	93.6%	92.4%	93.8%	94.3%	94.1%	93.6%	93.2%	93.3%	93.4%	94.2%	94.7%	94.3%

260. Openreach recognises the consistency in delivery required from an MSL of 95% in every GM region and to achieve this would need a greater degree of demand foresight or control, and whereas control of demand is limited by the proposed FAD MSL, this leaves demand foresight to enable improved planning of demand.

261. CPs provide Openreach with monthly forecasts of demand for copper and fibre Orders. Figure 29 and Figure 30 below indicate that, amongst the CPs that currently supply forecasts, there is a significant bandwidth of accuracy (measured each month), ranging from under-forecasting by 56% to over-forecasting by 85% for Copper and under-forecasting by 46% to over-forecasting by 88% on Fibre.

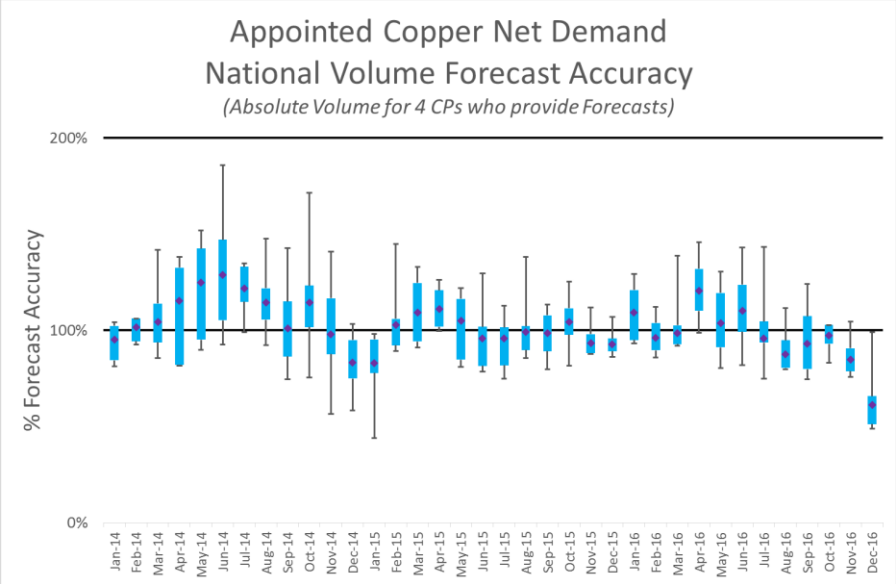


Figure 29: Range of National Appointed Copper Forecasting Accuracy across CPs (Total Order Volume)[108]

[107] 647 MSL Report archive

[108] SLAM: Appointment Availability FAD Results

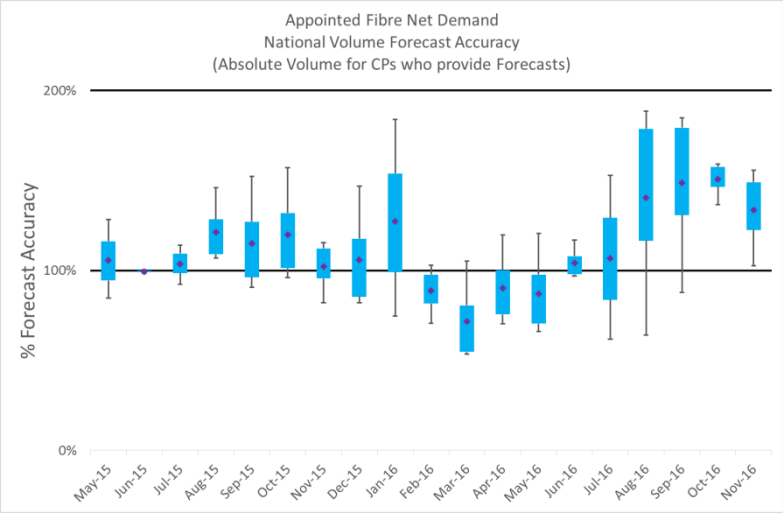


Figure 30: Range of National Appointed Fibre Forecasting Accuracy across CPs (Total Order Volume)[109]

262. When we look at the regional forecasts, so important to our resourcing investment and deployment decisions, the accuracy levels worsen for both Copper and Fibre as reflected in our Appointment Availability FAD results shared monthly with relevant CPs, with no obvious trend of improving.

263. Inaccurate forecasting from CPs and limited ability to constrain demand creates additional risk on the Openreach operation and requires a significant amount of resourcing flex to mitigate. Moreover regulatory pricing constraints mean that we do not have the option to regulate demand through changes to pricing. We are therefore in a position where demand can increase without adequate prior notice jeopardising our ability to balance our resource to deal with both our provision and repair workstacks.

264. We have the option to challenge SLG payments when provision demand significantly diverges from a CP's forecast. Currently there is no such safeguard within the MSL proposals. We propose that, as a minimum, Ofcom should re-use the current SLG forecast safeguards to trigger exemptions for provision MSLs (i.e. any provision QoS failures that are associated with out-of-limits forecasts would be excluded from the formal assessment of our performance against MSLs). We think such a trigger would also incentivise more efficient behaviour by CPs to the benefit to all industry and consumers.

265. Openreach is committed to hitting higher levels of provision on-time success for our customers but would like Ofcom to recognise the impact that the CPs can play in delivering better on-time success. These include:

- Working with us on the concept of "by" an order date for particular provision products, rather than on an order date. Some of the factors that would allow that are: flexible CRD, router information, CPE information, process for customers to connect CPE etc
- We would need industry commitment and measures / processes to support flexible consumption, with enhanced KCI messaging to support the customer experience

[109] SLAM: Appointment Availability FAD Results

- We would need commitment from CPs to continue working together with Openreach to ensure the right products are ordered at Point of Sale. Collaborative working would continue the drive to ensure the right information is displayed via the dialogue services, and our CPs consumption and own processes drive the right product selection, ensuring network is re-used whenever possible and customers offered the optimum lead-time.
- Further collaborative working to develop process and system enhancements to ensure that when a CP places at order for an additional line, the customer actually wants a second line, and not just wishing to transfer CP on their existing line. The current industry behaviour drives increased copper network build and extended provision journeys with poorer OTD performance.

Question 6.2: Do you agree with our proposals for new timely appointment availability standards? Please provide reasons and evidence in support of your views.

266. We are supportive of shorter lead times for both copper and fibre orders to enable greater choice for customers, but we believe that this will only deliver genuine benefit if it is part of a pan-industry initiative.

267. To deliver effective shorter lead times Openreach requires, as per the on time requirements, improvements in CP forecasting in order to effectively match resource to demand without creating inefficiency. We propose that Ofcom should re-use the current SLG forecast safeguards to trigger exemptions for FAD MSLs (i.e. any FAD QoS failures that are associated with out-of-limits forecasts would be excluded from the formal assessment of our performance).

268. The excerpt from the Jigsaw report that is reproduced below (as Figure 31) suggests that customer expectation is high with respect to lead times, even if it is not always reflected in the take up for shorter lead times when they are offered. Confirming our belief that customers value choice even if they do not always want the lowest level.

Service installations:

	Residential	SME
Getting through to someone who can help *(Ease of finding the number; time taken to speak to someone; IVR performance)*	MEDIUM	MEDIUM
Quality of first line support *(Understands customer's needs; ability to communicate; quality of conversation)*	HIGH	HIGH
Experience re-contacting/follow-up calls *(Whether need to re-explain issue; overall time taken)*	LOW	LOW
Speaking to 'right' person *(Quality of communication; advice given)*	HIGH	HIGH
Time taken from order to completion of order *(Explanation of process; speed of order; flexibility)*	MEDIUM	HIGH
Flexibility of engineer appointment *(Flexible timings; short timeslots; synchronisation of other services; updates)*	MEDIUM	HIGH
Quality of installation *(Arrival on time; flexibility re: building; professional manner; everything working before departure)*	HIGH	HIGH
Quality of set-up: mobile phones *(Ease of process; quality of support if required)*	MEDIUM	MEDIUM
Quality of set-up: self set-up of broadband *(Quality of instructions; ease of process and time taken)*	HIGH	HIGH
Follow-up *(Whether it occurs; quality of follow-up)*	LOW	LOW

Figure 31: Customer Expectations (Excerpt from Jigsaw report)

269. Ofcom should note that shorter FAD will not on its own deliver a shorter average time to install (ATTI). In fact there is a very low statistical correlation (R squared value 0.006)[110] . Shorter installation times will only be achieved through a joined up approach across industry.

270. Lower FAD will reduce ATTI to some extent. When Openreach offer lead times within 10 days, customer will not always take the offering, thus limiting the impact on ATTI. Figure 32 shows a declining take up of FAD as lead times are reduced.

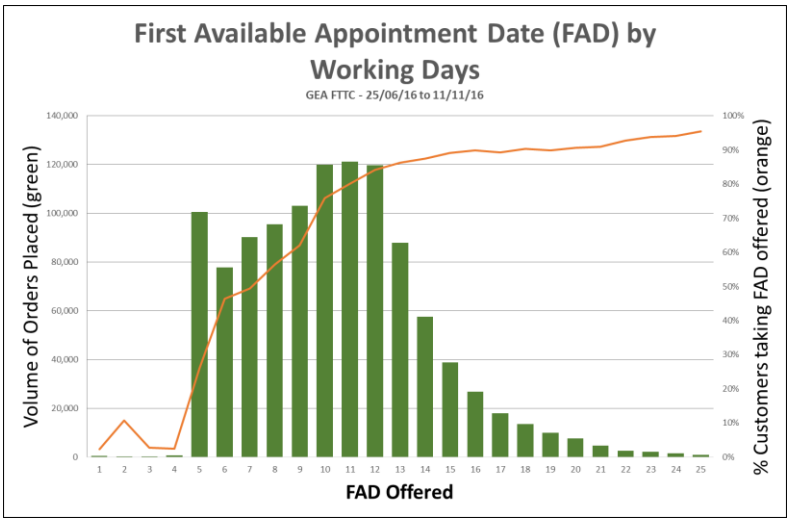


Figure 32: CP take up vs FAD Offered for GEA[111]

110

111 SLAM: Appointment Availability FAD Results

271. We have developed proposals for industry on core products (such as FTTC upgrades) to allow us to install quicker than the customer lead time where we find we have industry flex and when we know customers have installed their new modems. We believe initiatives like this offer greater flexibility and allow us to collectively exceed a customer's expectation. We need more support and traction from CPs in delivering these initiatives and actually make them happen. Once again we are subject to long lead times in any CP related consumption which often prolongs adoption and limits customers benefit.

272. Ofcom states that "*the benefits of further shortening the timescales for installation appointments may be limited at present, although changes in customer demand and retail practices may lead to CPs seeking shorter lead times from Openreach in future*" (6.19).

273. Openreach supports the view that shortening the current timescales for installation appointments provides little benefit at the moment as CPs would be unlikely to utilise such appointments. This may in part be due to constraints within their own systems and processes, in particular CPE dispatch. Openreach analysis already supports a view that short lead-time appointments available today are not fully utilised.

274. Ofcom justifies the reason for raising the lower bounds of performance because Openreach have continually exceeded the minimum standards, i.e. delivering above target for the last 3 years of between 14% and 79%.

275. Assuming Ofcom accept the proposal from Openreach to re-use the current SLG forecast safeguards to trigger exemptions for provision MSLs where demand exceeds a CPs forecasts, Openreach agree a higher threshold of FAD is appropriate. However, if these are not acceptable to Ofcom, Openreach would propose a lower target of 80% as a threshold for 10 working days.

Question 6.3: Do you agree with our proposals regarding compliance? Please provide reasons and evidence in support of your views

276. The proposal to apply annual quality standards for installation date certainty to the aggregate of orders for WLR, MPF and GEA FTTC is supported by Openreach and aligns with the Openreach Charter commitment (Charter included SMPF) to deliver 95% on time installation.

277. We agree with the proposal to continue assessing this annually over the 10 GM regions. For operational reasons, we may occasionally change our GM structure to optimise our operational performance (e.g. the recent splitting of Wessex into two GM areas) but we do not believe that any such changes should be flowed through into MSLs. However, where there are movements of small areas between GM patches, we believe that it is appropriate to reflect the updated structure in our MSL reporting (as the alternative is to maintain a potentially meaningless "*shadow*" organisational structure for the sole purpose of providing MSL results).

Question 6.4: Do you agree with our proposals to minimise installation delays and improve the customer experience? Please provide reasons and evidence in support of your views.

278. We do not agree with the removal of the cap on SLGs. It is normal commercial practice to include a cap on compensation payments in any SLA contained within a commercial contract so that liability is not open ended or unlimited. In addition, we are already incentivised to fixed these installations and repairs as soon as possible because, if a customer is out of service for 60 days, we will have already paid the CP 5 years of line rental meaning that the customer is never going to generate returns for the business. We believe that this is incentive enough without the need for uncapped payments.

279. Openreach recognises the need to reduce delays on orders because delays can frustrate both end customers and CPs. Operationally we have prioritised our focus on copper tails beyond 90 days. Over the last 18 months, we have reduced these by over 50% (see Figure 33 below) and we have the ambition to further reduce this by eliminating delays under Openreach's influence. Our priority here is to improve the customer experience, and this reduction has been achieved without Ofcom creating further QOS remedies.

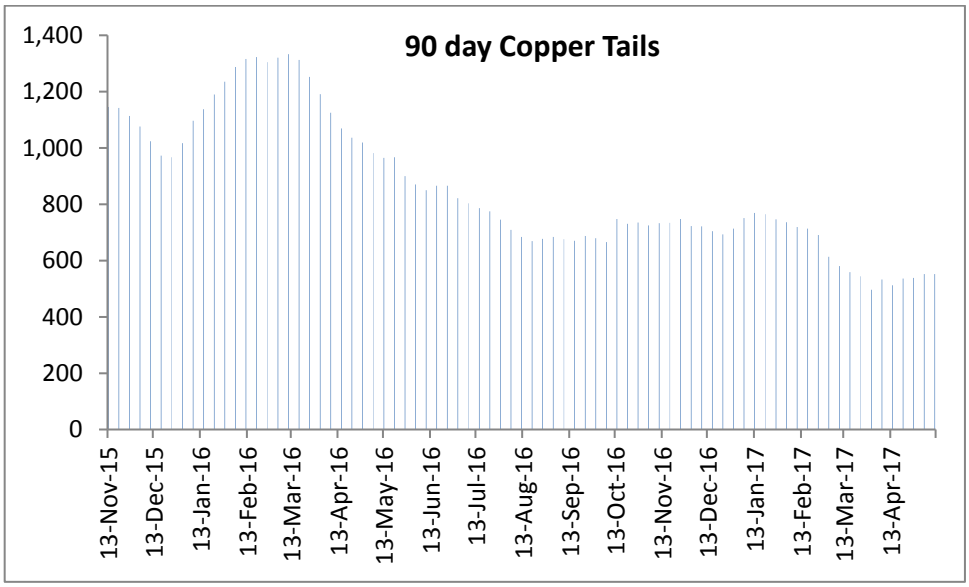


Figure 33: 90 day Copper Tails (Provision)[112]

280. We have achieved our current successes as a result of increasing the speed of the functional teams in the process through a continuous improvement process. Our focus is now shifting to understand how we eliminate the cause of orders with protracted delays. Our initial analysis shows 80% of these are driven from gold address key match failures, i.e. where it is believed that the address has been served before and capacity exists but the engineer identifies this not feasible when visiting. These are caused by insufficient network capacity or complex faulty circuits. The remaining 20% is due to bronze key (non-previously served address) failures, i.e. where we have committed KCI2 too early to our customer knowing there is inherent risk in this date, a proportion of these fail and become tails. Our commit when confident programme will look to address a proportion of this.

[112] PT90 Copper provision tails (PT1 report)

281. CPs play an important role in the use of the network, selecting the incorrect order journey for their customer may tie up valuable engineering resource for no reason. 4.1% of new line provides have a cease at the same location within the cycle of a subsequent bill (120 days), this equates to 1400 circuits per week. CPs need to ensure dialogue with their customers to ensure the most appropriate solution is provided.

282. We have a dedicated Customer experience team working with CPs to improve the correct use of order journeys. However, take up of best practice can often be slow or deprioritised if it requires CP system development.

283. We are pleased that Ofcom recognises that not all delays are due to Openreach. The common examples of these are:

- Excess Construction costs, where the customer has a 30 day period to agree to proposed costs.
- Civil Engineering section 58 noticing with local authorities or highway authority in order to excavate the highway. These can be up to 90 days as a result of provision being classed as non-emergency work.
- Holiday period embargos for traffic lights or road closures, for example High streets at Christmas or holiday routes in summer.
- Gaining permission from land owners or landlords (Wayleaves)
- Permission to work in zone of Interest, requiring agreement with 3rd parities to complete works in specific safety or risk areas, for example National Grid or Railtrack.

284. Openreach believes that, based on the reduction in delayed orders driven independently without further regulation in the last 18 months under its own drive to improve customer service and the impact CPs have upon the order journey, there is insufficient reason i.e. no objective justification to remove the 60 day cap. In light of recent improvements the case for removal of the cap is weaker now than it has previously been.

285. Ofcom proposes to require Openreach to provide periodic main causes of delays for late installation covering issues such as:

i. Infrastructure build
ii. Surveys, planning, build and contractors
iii. Issues related to network capacity
iv. Issues concerning permissions such as may be required from landlords, landowners and local authorities

It is unclear for what purposes Ofcom require this level of information and therefore we would welcome further discussion with Ofcom on this.

286. Orders will generally undergo a number of complex processes and establishing a simple cause is not often possible. In general, the order delay will be down to a series of issues that are identified and addressed. The activities that occur beyond our commitment date, are very often the recovery activities to provide service to the customer. For these reasons, there are significant issues in collating and reporting data on main causes of delay. Further clarification would be needed on the categorisation of the delay to enable transparent reporting of provision delays.

287. We welcome the Ofcom proposal that the OTA2 should work with Openreach and industry to explore improvements aimed at improving the customer experience.

288. We agree that Openreach and CPs should collaborate to identify options for providing temporary service to customers that have no broadband or voice service.

Question 6.5: Do you agree with our proposals newly installed lines not working? Please provide reasons and evidence in support of your views.

289. We agree that further regulation is not needed in this area. Not only are these faults covered by all of the other regulations but they are also an area of significant focus for us and form part of the service ambitions that we share with CPs. We continue to set ambitious goals in this area and will work closely with our CPs to deliver the improvements that we all want to see.

290. ELFs are a shared industry issue and we believe the role of OTA2 is key. The need for CP standards/KPIs is really strong here and we would seek to develop a collaborative understanding of the following factors:

- What does the CP do to check for in-home wiring issues?
- How often does the CP opt for *"Engineer Install"* (in light of suspected home-domain problems)?
- How early are hubs supplied?
- How many hubs are pre-installed on the day of provision etc.?
- Does the CP consume Brandenburg to identify home-wiring issues?

291. Reducing Dead on Arrivals and Early Life Failures is a top priority for Openreach. As part of the Openreach 2017/18 roadmap a comprehensive action plan has been established to firstly drive operational compliance within our Engineering workforce and secondly address the root causes through our processes and systems to generate a sustained reduction in the Early Life Failure and Dead on Arrival rates.

Question 6.6: Do you have any further comments on our proposals for regulating BT's service performance for installations? Please provide reasons and evidence in support of your views

292. We welcome the increasing service levels for installations outlined in the Consultation Document. This is an area where we have significantly out-performed the MSLs.

293. We believe, however, that achieving the proposed increased service levels will require a further level of CP collaboration and co-work to achieve (and indeed surpass) the desired uplift. We believe to ensure this is effective industry will need to be correctively incentivised to resolve the key issues:

- CP forecasting accuracy to help Openreach to resource effectively and create a proactive plan to balance peaks in demand.

- Ordering the right products Point of Sale to effectively utilise the network. This requires CPs consumption of provision releases and to ensure and own processes drive the right product selection. Without this CPs enforce inappropriate build of the network creating customer delays and needless expense.
- Ordering the right products Point of Sale to avoid Early Life Fails. Openreach and Industry need to work together where an engineering visit would be more desirable for the smooth transition into life for the customers service instead of opting for a cheaper self-install option.

294. Service is at the heart of the Openreach strategy and we have already developed and communicated a suite of service commitments to our customers that focus on a board range of provision improvements. We have continued to exceed all the provision MSLs and continues to strive for higher levels of service for our customers.

7. Transparency of BT's service performance for repairs and installations

Question 7.1: Do you agree with our proposals relating to the KPI reporting obligations set out above? Please provide reasons and evidence in support of your views.

295. Openreach agrees with Ofcom that it is appropriate to continue to report on its performance including aspects that are not subject to minimum standards. Openreach already shares a comprehensive set of KPIs with industry (e.g. "heat maps" or industry service pack published on its portal) and performance is discussed regularly at the monthly Service Management Forum. Openreach also provides a set of weekly and monthly reports to the OTA2.

296. We also agree with Ofcom that it is appropriate to continue to report a number of key KPIs on a publically accessible web site for the benefit of end customers. We will work with Ofcom to agree the data that will be published and the format in which it will be presented.

297. We note, however, that following the review of the KPIs that Ofcom has carried out, the reporting burden on Openreach will increase:

- Although Ofcom is proposing to remove a number of KPIs, the majority is being replaced by additional reporting on existing KPIs with only 3 KPIs being genuinely removed (Gateway availability KPIs and average installation time for all orders).
- Although Ofcom is proposing to remove the volume KPIs, the requirement to provide volume information remains (requirement to publish numerators and denominators for specified KPIs) and has been extended.
- The requirement to report on tails (late fault repair and provisions) has also increased (inclusion of additional data points and extension of the reporting to GEA-FTTC and GEA-FTTP).

298. We have documented below our comments (including concerns and queries) on specific aspects of Ofcom's proposals.

<u>Gateway Availability KPIs</u>

299. Ofcom is proposing to remove the Gateway Availability KPIs which we welcome. The reporting showed that availability of our gateway has been stable and fairly high (between 94% and 98% including the impact of planned and unplanned outages) since August 2014. In addition, we have SLGs in place that are payable in cases of unplanned outages or when planned outages exceed their planned duration.

300. Ofcom, however, did not propose to remove the Gateway Availability KPIs in the ISDN2 and ISDN30 markets in its Narrowband Market Review consultation of December 2016[113].

[113] See https://www.ofcom.org.uk/__data/assets/pdf_file/0016/95011/Narrowband-Market-Review.pdf table 9.3

301. We believe that Ofcom should take a consistent approach in all of the markets and should also remove the need to report on Gateway Availability in the ISDN2 and ISDN30 markets.

Repair KPIs

302. We agree with Ofcom's proposal to expand the reporting requirements for repair (KPI(iii), KPI(x) and KPI(xii)) to SML4 (where existing KPIs are limited to SML3). This will give CPs visibility of our performance on repair across the whole range of SMLs for all relevant products except for WLR where WLR Premium has a different SML provided in tariff (which was introduced in 2014 as part of the relaunch of WLR Premium).

303. The SML provided in tariff for WLR Premium is Business 2 Plus that has the same SLA as SML2 (clear by end of next working day, Monday to Saturday, excluding Public Holidays and Bank Holidays). SML Business 2 Plus is currently not included in the existing mandatory non-discrimination repair KPIs (where the reporting is at SML level) and is not included in Ofcom's proposed KPIs. This impacts circa 2.4m lines[114] serving business end customers.

MBORC KPIs

304. Ofcom is proposing to maintain the requirement to report on installations and repairs impacted by MBORC and to change the existing KPIs.

305. We note that Ofcom has not provided any rationale or explanation for the proposed change of KPI. Specifically, Ofcom has not explained why it is necessary to: (i) split the data between high level and local MBORCs; and (ii) to measure faults that missed their SLAs or provisions that missed their commitment dates and were impacted by MBORC declarations as a percentage of total faults or provisions that were impacted by MBORC declarations (and not as a percentage of faults or provisions that were completed in the reporting period). The latter would provide the contribution to failure of faults or provisions that were impacted by MBORC declarations and would enable Ofcom to monitor trends.

306. We are not expecting this situation to change in the next market review period and on that basis, we do not agree that the proposed modified KPI is appropriate (in particular, we do not believe it is objectively justified, reasonably necessary or proportionate). Furthermore, given the extremely low volumes reported so far, we do not believe that it is necessary to split the volume between high level and local MBORCs. We would therefore ask Ofcom to reconsider its proposal and to limit the reporting to the existing KPI (volume of installations (orders) that missed their commitment dates, were eligible for SLG payments and were impacted by MBORC declarations). This would enable Ofcom to identify any changes in volume and take action as appropriate should concerns arise over the market review period.

307. With regard to repairs affected by MBORC declarations that missed their SLAs, we provided the information requested in the modified KPI to Ofcom for period 2011/12 to 2015/16 in March 2017. At the time, we advised Ofcom that in respect of (a) High Level MBORC Declarations[115]:

    - The total volume of faults affected by high level MBORC was calculated as the sum of the volume of faults that met their SLAs and were impacted by high level MBORCs and the

[114] As at 28 April 2017. The total also includes 3,693 WLR Basic and MPF lines that are also on SML Business 2 Plus.

[115] Schedule 1 KPI (XI) Page 265 Ofcom WLA QoS Consultation

volume of faults that failed their SLAs and were impacted by high level MBORCs.

- To identify the volume of faults that met and failed their SLAs that were also impacted by high level MBORCs, we first extracted the volumes of these faults from our end to end strategic measure for repair (RD3). We then mapped across the high level declarations that were made by BT using start dates, end dates and geography to identify the volume of these faults that were also impacted by MBORC.

308. We also advised Ofcom that in respect of (b) Local MBORC Declarations[116]:

- We have no reliable way of identifying faults impacted by local MBORC in our systems (including faults that met their SLAs).
- We compared the volume of faults that failed their SLAs and were not impacted by high level MBORC (result of the mapping of the high level MBORCs across the volume of faults that failed their SLAs) with the SLAM (Service Level Agreement Management) system data to identify the faults that failed their SLAs, were liable for SLG payments and were impacted by local MBORCs. For that purpose, we assumed that the faults that were in the SLAM data and not impacted by high level MBORCs were impacted by local MBORCs.
- We carried out some separate fault analysis to try to estimate the volume of faults impacted by local MBORCs that met their SLAs and suggested a way to Ofcom.

309. As can be seen from the above, the provision of the modified KPI data is (i) fairly complex; (ii) relies on comparing data from various sources; and (iii) for the volume of repairs affected by local MBORCs, could at best only be an estimated volume, we therefore believe that it would be disproportionate to provide this information on a monthly basis. We would therefore ask Ofcom to reconsider its proposal and to limit the reporting to the existing KPI (volume of faults that missed their SLAs, were eligible for SLG payments and were impacted by MBORC declarations). This would enable Ofcom to identify any changes in volume and take action as appropriate should concerns arise over the market review period.

310. Ofcom considers that the modified KPI data is an essential input for the MBORC allowance calculations for the repair QoS standards. This, however, does not necessarily mean that the data should be provided on a monthly basis, particularly as the QoS standards are fixed for the market review period. We therefore believe that this data could be provided to Ofcom on a less frequent basis (e.g. once a year) or at the end of the review period and requested under formal powers as opposed to being included in the KPI requirements.

<u>Percentage of repeat faults KPI</u>

311. Ofcom is not proposing to change the repeat faults KPI.

312. Openreach measures repeat faults for WLR over a period of 30 calendar days and over a period of 28 calendar days for all other products. This difference is reflected in the existing directions relating to Key Performance Indicators.

313. We would therefore ask Ofcom to also reflect this difference in the proposed direction and amend the legal instrument accordingly.

[116] Schedule 1 KPI (xi) Ofcom WLA QoS Consultation

314. Separately we would like to bring to Ofcom's attention the fact that Openreach repeat fault measures are based on faults reported (and not completed) within the 30 / 28 calendar day window following the completion of a previous fault. This is what has been reported under that KPI.

Publication of numerators and denominators

315. Ofcom is proposing to replace the reporting of volume KPIs with an obligation to publish the numerators and denominators of specified KPIs. Whereas the volume KPIs that BT was mandated to publish were limited to the industry volumes (all third parties including BT) and explicitly excluded the separate publication of BT's own volumes (which were provided separately to Ofcom), the current proposals appear to include all numerators and denominators including those related to BT's own KPI results.

316. We are concerned that publishing BT's own volumes would disclose commercially sensitive information and would give BT's competitors an unfair insight into BT's commercial activities. We would therefore ask Ofcom to explicitly remove the requirement to publish numerators and denominators for BT's own results and amend the draft legal instrument accordingly. We will of course continue to provide these figures to Ofcom.

317. Ofcom has not requested the publication of numerators and denominators for KPI(xii) (average time to restore service for repairs that have exceeded the Service Level Commitment by more than 20 working days). We think, however that it would be helpful to publish numerators and denominators for the industry average results to provide some context to the results where a small number of very difficult jobs could drive these KPI results. Furthermore, we think that the result for KPI(xii) should be expressed in working days and not in working hours as this would be more meaningful given the relatively long time these faults take to clear. The draft legal instrument should be amended accordingly.

GEA-FTTC

318. We note that Ofcom has extended the requirement to publish repair KPIs for GEA-FTTC to SML1 (i.e. KPI(iii)(a), KPI(x)(a) and KPI(x11)(a)). GEA-FTTC is offered with SML2 in tariff and there is no option for CPs to buy SML1 as is currently the case with MPF.

319. On that basis, we would ask Ofcom to remove the requirement to publish GEA-FTTC repair KPIs for SML1 and amend the draft legal instrument accordingly. We, however, agree with Ofcom that were Openreach to make SML1 available on GEA-FTTC, it might be appropriate to report on repair performance at that level.

320. With regard to the appointment availability (KPI(i)) and average first available appointment date (KPI(iv)) KPIs for GEA-FTTC, we understand that Ofcom is proposing to modify the existing KPIs such that the modified KPIs will measure performance against the appointment availability standard (Quality of Service Standard 1) [117]. We also understand that Quality of Service Standard 1 for GEA-FTTC will apply to all appointments, both at the cabinet and end customer's premises[118].

[117] See https://www.ofcom.org.uk/__data/assets/pdf_file/0016/95011/Narrowband-Market-Review.pdf paragraph 7.14 bullet points "Appointment availability" and "Average first available appointment date".
[118] See https://www.ofcom.org.uk/__data/assets/pdf_file/0016/95011/Narrowband-Market-Review.pdf footnotes 124 and 16 and paragraph 6.66.

321. The proposed KPIs ((i) and (iv)), however, relate to Appointed Orders that Ofcom has defined as "*Orders that require an appointment for an engineering visit by the Dominant Provider to the end user's premise in order to become Completed Order*s" and as currently worded, exclude appointments at the cabinet for GEA-FTTC. Ofcom should therefore consider modifying the KPI description or the definition of Appointed Orders if it is its intention that the proposed KPIs measure performance against the appointment availability standard.

322. Ofcom should also be mindful that the definition of Appointed Orders also applies to KPI (vi) (provisioning of appointed orders) and KPI(vii)(a) (average installation time in relation to Appointed Orders) and should clarify whether these KPIs should apply to all appointed orders (including at the cabinet) or only to customer's premises appointed orders (as per the proposed definition).

323. Finally, KPI(xv) (percentage of missed installation appointments) relate to missed installation appointments which could be either at the cabinet or the end customer's premises. It would be helpful if Ofcom could specify which appointments should be included in the KPI to ensure the reporting meets Ofcom's requirement and amend the draft legal instrument if appropriate.

GEA-FTTP

324. As part of the current mandatory non-discrimination KPIs, Openreach publishes some volume information for GEA-FTTP. However, as BT has 99.9% of the installed base, we do not currently publish the volume of installed base as this would reveal BT market share information, which is commercially sensitive and could give BT's competitors an unfair insight into BT's commercial activities.

325. We would therefore ask Ofcom to explicitly remove the requirement to publish numerators and denominators from KPI(xiv) (percentage of installed base reported as faulty) for GEA-FTTP and amend the draft legal instrument accordingly. We will of course continue to provide these figures to Ofcom.

Relevant regions

326. Openreach, in response to questions 5.5 and 6.3, is proposing some changes to the regional structure to which the proposed MSLs would apply. To ensure consistency between MSLs and KPIs, particularly where the proposed KPIs measure performance against the MSLs, the regional structure used for KPI reporting should be the same as that used for the MSLs.

327. Were Ofcom to agree to the changes proposed by Openreach, these should be reflected in the legal instrument.

KPI publication and submission to Ofcom

328. Ofcom is proposing to maintain the current requirement to publish and provide to Ofcom the KPI data within 14 working days of the last working day of the month and within 14 working days plus one month for the MBORC KPIs. Ofcom is also proposing to maintain the current requirement to publish the public KPIs within 14 working days of the last working day of the quarter.

329. We agree that this provides sufficient time to extract the data and prepare the reports. We note, however, that in the BCMR the deadline for publication of the public KPIs has been set at 15 working days after the last working day of the quarter and that in practice Openreach publishes all public KPIs by the earlier deadline as they are published together.

330. From a practical point of view, it would be helpful if Ofcom could align the deadline for publication and submission of the KPIs in all the relevant markets (WLA, Narrowband and BCMR). Accordingly we suggest that the draft legal is amended to refer to 15 working days instead of 14 working days.

Future developments

331. As noted in the Wholesale Local Access Market Review consultation document[119], "*Openreach is in the process of developing a VULA variant known as 'single order GEA' (SOGEA), where the copper bearer will be included within the VULA service so that it can be purchased without also purchasing WLR or MPF*". SOGEA is expected to be launched in spring 2018, within the market review period.

332. It would be helpful if Ofcom could indicate how it expects this new product to be treated with regard to the KPI requirement.

Question 7.2: Do you agree with our proposal to require BT to submit a quarterly report on late repairs and installations, and the reasons for their delay? Please provide reasons and evidence in support of your views.

333. We agree with Ofcom's proposal to introduce enhanced transparency for late repairs and installations and would be happy to work with Ofcom to agree the form and content of a report that provides Ofcom with sufficient information to enable Ofcom to monitor and understand why some repairs and installations take a long time to complete.

334. We would also be happy to work with Ofcom to agree the form and content of a publically available report aimed at end customers and CPs. We do not believe the proposed report would be suitable for that purpose.

335. We note Ofcom's concerns about the lack of information on causes of delays impacting late repairs and installations. We recognise that late repairs and installations have a negative impact on CPs and end customers and we are committed to addressing the issue and have an on-going improvement programme in place aimed at addressing underlying causes of tails and delays in their recovery.

336. We would be happy to provide Ofcom with regular updates on the progress of our improvement programme including quantitative data on late repairs and installations (items a to d of Ofcom's proposed report). The quantitative data could also include a breakdown of the total volume of late repairs and installations by key cause of delay (e.g. wayleave, traffic management, civils etc.). We however believe it would be disproportionate to provide Ofcom with items e to g of the proposed report for every single late repair and installation.

337. We would welcome the opportunity to highlight areas outside of Openreach's control that cause delay in providing service.

[119] Volume 1, paragraph 8.54 and footnote 164

Question 7.3: Do you have any further comments on our proposals for transparency around Openreach's service performance? Please provide reasons and evidence in support of your views.

338. We have no further comments to make on Ofcom's proposals for transparency around Openreach's service performance.

8. Proposed quality of service remedies

Question 8.1: Do you agree with the combination of proposals we have made regarding quality of service for repair and installation and regarding faults? Please provide reasons and evidence in support of your views.

339. We fully support the Ofcom strategy of continuing to uplift service though the WLA consultation process. We believe that it is vital the improvements offer value for money to the industry and should be valued by consumers. However, for this reason, Openreach does not agree with all of the details behind Ofcom's proposals.

340. We believe that all service uplifts should be stretching but they should also be fully funded and operationally deliverable. We have set ourselves stretching goals to drive improvements beyond the current minimum service levels and we believe our recent performance demonstrates the strength of our commitment to driving up the standard of service we offer to our customers.

341. We agree with Ofcom that CPs place a greater priority on certainty of repair over speed. Ofcom quote research indicating that customers are not seeking reduced time to repair at any cost, which questions the justification for setting repair MSLs at a level well beyond the point where value for money is delivered for incremental on-time repair improvements. The fact that, on average, a customer will have a network fault every 9 years indicates there are other pain points experienced by customers caused by factors beyond the Openreach domain.

342. We do not agree with Ofcom's Repair MSL proposal as we believe that the Year 3 Repair MSL of 93% is unachievable based on the current industry framework and processes. We have however demonstrated and quantified two identified structural process and measure changes that Ofcom could impose to raise the glass ceiling by (i) correcting the on-time measure to give Openreach an exemption when customer access and readiness issues are encountered on non-appointed faults and (ii) removing the Clear Reject process from the WLR3 and NGA products, bringing them in to line with MPF.

343. We also do not agree with the proposed increase in Year 2[120], where the repair MSL moves up 7% points from 83% to 90%. Such a marked uplift in service will require a level of recruitment and training that is above anything undertaken previously. We believe this creates a risk to industry and consumers if we are forced to move too far too quickly to the detriment of existing performance.

344. In section 5 of this document we provide a comprehensive justification for a revised glidepath which, although highly challenging, we believe will be operationally feasibility and deliver value for money.

345. We also highlight in section 4 of this document our commitment to FVR. We doubled our FVR spend in 2016/17 and have, in 2017/18 changed our recruitment/skilling approach to recruit £[✂] engineers specifically to carry out FVR. We also explain that our FVR plans will not deliver fault volume reductions in line with Ofcom's expectations. Ofcom's analysis was built around early non-underpinned, aspirational investment scenarios from Openreach. This further impacts on

[120] We also set out in Section 5 why we think the MSL for Year 3 should be set at 90% (and the glidepath adjusted) in order to ensure it is consistent with Ofcom's legal obligations, including only to impose proportionate, objectively justifiable remedies that are no more burdensome than necessary.

the operational feasibility to achieve the proposed service levels.

346. We do not agree with Ofcom's "SLA+5 working days Repair Tails MSL" proposal and outline our response in question 5.1. We do not believe this additional MSL is justified.

347. We welcome the increasing MSLs for installations and this is an area where we have consistently out-performed the MSLs. In section 6 of this document we respond in more detail as we believe that to consistently achieve these levels we will require a further level of CP collaboration, such as improved forecasting accuracy.

348. We are supportive of shorter lead times for both copper and fibre orders as we believe that this enables greater choice for customers.

349. We also agree MSLs should be set at the same level for SML1 and SML2 and that, for each relevant SML, the results should be from the combined product set of WLR3 PSTN, LLU MPF, and GEA-FTTC.

350. We believe it is vital that any improvements to quality of service offer value for money to both customers and industry. We agree with Ofcom that meeting the proposed MSLs will increase our costs and that this should be taken into account within this Charge Control. We believe Ofcom has significantly understated the additional cost that this will drive into our business i.e.: (i) *overstating* our FVR investment; (ii) *understating* our true FVR costs; (iii) *understating* the resource needed to deliver service; (iv) *omitting* the additional costs associated with uplifting resource with an aggressive efficiency assumption. We provide evidence on these four areas within this document.

351. We have carried out extensive and detailed modelling and analysis of the relationship between manpower used and service delivered. We have clearly shown in our response to question 8.2 that as the repair MSL approaches the 'glass ceiling', we begin to get diminishing returns with regard to the service delivered. We need to ensure the true operational dynamics of a complex service organisation are modelled correctly and we have identified that simplifying assumptions will result in a significantly understated, and inaccurate resource impact.

Question 8.2: In Annex 7 we set out our analysis and estimates of the resource implications of quality standards, including the assumptions and results of the Resource Performance Model that we commissioned consultants to develop. Please state whether you agree with our approach and estimates as set out in Annex 7. Please provide reasons and evidence in support of your views.

352. Openreach does not agree with the approach and estimates set out in Annex 7. We believe there are a number of simplifications in the approach that under-estimate the true level of resource required to meet the service levels. We explain in this section the modelling approach we have taken and why we do not agree with Ofcom's approach and estimates.

353. Openreach welcomes the depth of Ofcom's modelling and recognises their acknowledgement of the possible inaccuracies that may have been introduced by the simplifications made within the modelling carried out by their commissioned consultants. Openreach is committed to the full disclosure of the operation of its Allocation Model which is a highly flexible model that enables many of the true dynamics of our business to be explored. This model – developed for us by EY and populated with three years of actual job-level history – has been extensively tested and calibrated by Openreach and is the best simulation of likely service outcomes that we have used to date.

354. We have split the response to this question into two sections:

- **'Raw' Resource Estimates**: In this section we respond to Ofcom's estimates of the incremental resource needed to deliver these elevated levels of service: (i) we compare the approach taken by Ofcom's commissioned consultants with that taken by Openreach (ii) we compare the results obtained by the two approaches for a common set of input assumptions and consider why differences might exist between the two sets of results and (iii) we present the results provided by our Allocation Model for a range of different scenarios.
- **'Actual' Resources Required**: Here we take the raw resource estimates and add in the recruitment, selection, training, buddying and time-to-competence impacts, thereby showing the total cost to Openreach of scaling our business up in this way. We also comment upon the way in which Ofcom convert the estimates of incremental resource into a financial impact.

355. In this section we clearly demonstrate the Allocation Model provides an accurate simulation and reflects the underlying operational complexities within Openreach. We also show that setting an MSL in Year 3 at 93%, rather than 90% increases the cost to support the higher service by £[✂]m across the Charge Control period. These significantly costs clearly alter the proportionality assessment that Ofcom has undertaken.

'Raw' Resource Estimates

356. Ofcom commissioned consultants (Analysys Mason) to develop a model (the Resource Performance Model) to provide insight on the additional engineering resource that would be needed to deliver a specified level of service. While Openreach appreciates the work to produce the Resource Performance Model under the time constraints, there are a series of over-simplified assumptions which have a significant impact on any results. In the Consultation Document, Ofcom provides a clear summary of the most significant areas where the Resource Performance Model had to be simplified to provide results within the demanding timescales associated with this consultation i.e.: [121] (i) job durations; (ii) volume of resources; (iii) pro-rating resources across regions; (iv) allocating resources between repair and provision; (v) skill level of Openreach technicians; (vi) job-handling and glass-ceiling effects; (vii) MBORC. Openreach can demonstrate that these simplifications mean that the outputs do not adequately reflect the way that our business operates in practice and, as a consequence, significantly underestimates the necessary uplift in resource required for the higher levels of service performance.

357. For the last Charge Control, Openreach modelled the resource/service relationship using a simplified modelling tool (the Distribution Model). Whilst this gave good estimates of the resources required for marginal changes in resource/service, it lacked the ability to accurately assess the implications of the step change in service being considered as one approaches the glass ceiling of what is possible. It also attracted a number of criticisms from Ofcom (such as its use of constant job duration) which we agreed needed to be addressed in future modelling work.

358. As a response to these limitations, Openreach commissioned consultants (EY) to develop a more sophisticated model (the Allocation Model) which could more accurately simulate the dynamics of our business. An overview of the inputs and model logic of the Allocation Model is summarised in

[121] "Analysys Mason report: Overview of the Quality-of-Service model and its outputs for WLR/LLU Charge Control 2017"

Figure 34 below, with a detailed model description provided by EY in Annex 2.

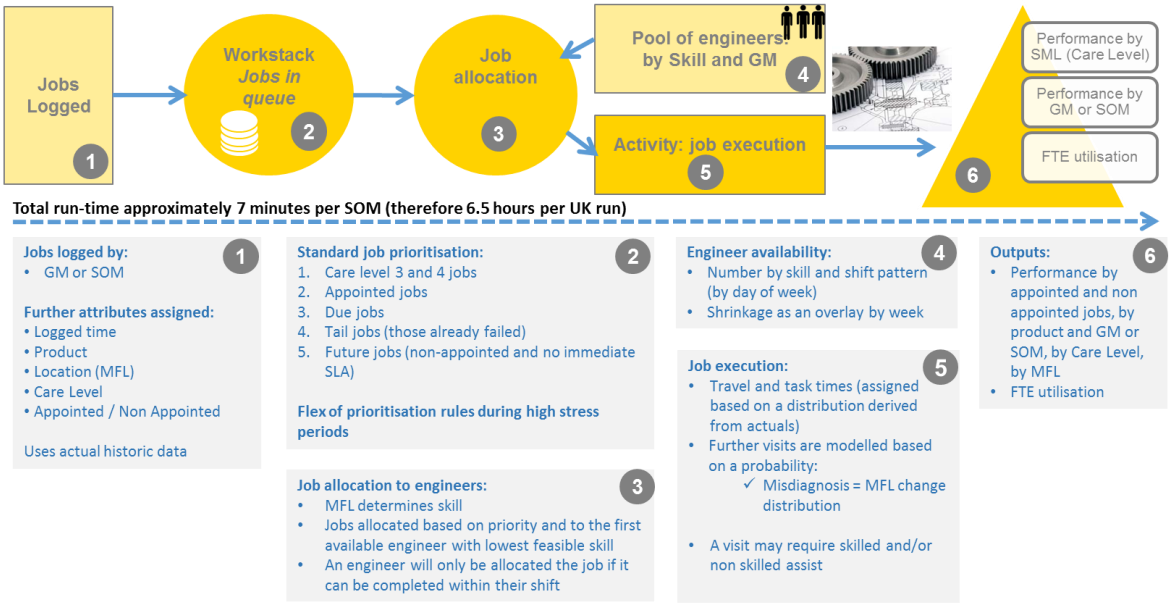


Figure 34: Operation of the Allocation Model[122]

359. In summary, the Allocation Model represents more of a traditional workforce simulation/queuing model which uses available resource and detailed product dynamics as inputs to then run scenarios and calculate relevant service outcomes/performance. It uses a Discrete Event Simulation (DES) approach and can prioritise and allocate jobs in the workstack to engineers (FTE), simulate the completion or furthering of the tasks, the likelihood of multiple visits and the impact of travel and task time. The model can interact with different supply and demand input parameters, providing a far more granular analysis – allowing us to adjust a wide range of demand and supply levers – as summarised in Table 13 below:

[122] Openreach presentation to Ofcom: "Openreach Service Demand Modelling - Allocation Model"; 27th April 2017

Table 13: Allocation Model - Demand and Supply Levers[123]

Demand Levers	Supply Levers

• Job Volumes
  • By week by SOM
  • By product/type (e.g. WLR, MPF, GEA)
  • By MFL for repair (e.g. CE, CA, LN)
  • By Care Level for repair
  • Appointed and non-appointed splits
  • Prioritisation changes by product
• Visits
  • By SOM
  • By product/type and Main Fault Location (MFL)
  • Visit ratio will also simulate MFL changes e.g. CE to LN
  • Assist propensity – skilled and unskilled
• Task times
  • By SOM
  • By product/type and MFL
  • Different distributions based on engineer skill
  • Adjustment factor by week and by skill
• Travel time
  • By SOM
• Logged time/Appointment profiles
  • Ability to simulate different arrival profiles
  • Ability to vary appointment take-up
• Stress Factors
  • Simulates the ability to respond to times of different stress e.g. pushing out appointment books, increasing focus on clearing tails
	• FTE
	  • By SOM
	  • Adjustments by week for recruitment and attrition
	  • Attendance profile/shift pattern – by skill and by weekday
	• Shrinkage
	  • By SOM
	  • Split by:
	  • Core shrinkage (Leave, sick)
	  • Learning, safety, team, 1:1s
	  • Productive non-work manager activity
	  • Productive but non-service impacting
	• Skills
	  • By SOM
	  • FTE can be split by skill type e.g. OMI/CAL/UG/BBB
	  • Skilling profile can be adjusted by week e.g. for upskilling initiatives
	  • Hierarchy of skills to product/type/MFL (e.g. 'LN' tasks assigned to UG-skilled resource only).

360. A comparison of the key capabilities, limitations and impact on outputs of the three available models (Openreach Distribution Model, Ofcom Resource Performance Model and Openreach Allocation Model) has been summarised in Table 14 below.

[123] Openreach presentation to Ofcom: "Openreach Service Demand Modelling - Allocation Model"; 27th April 2017

Table 14: Capabilities and Limitations of the three Available Models

	Distribution Model (DM)	Resource Performance Model (PM)	Allocation Model (AM)	Impact
Approach	Top Down	High level Queuing Model	Bottom Up Simulation Model Prioritisation rules simulating taskforce allocation	DM: Rough Estimate PM: "Perfect world" AM: Realistic simulation
Input volumes	Actual orders/faults per week at SOM level	Actual faults at SOM, orders are a pro-rata of national volumes using 2011/12 system size splits. MSL only	Actual orders/faults per week at SOM level. All field activity included (both MSL & non-MSL)	DM: Reflects reality PM: Approximately accurate, impact minimal AM: Reflects reality accurately
Engineer visits	Aggregated unique job (FURthers + ASSists + COMpletions)	Unique job (FURthers + COMpletions)	Individual visits for FURthers, ASSists and COMpletions	DM/PM: Simplified – operational dynamics to fix more complex faults are ignored and so likely to underestimate necessary resource AM: Reflects reality accurately
Task times and travel	Total end to end time per job including Travel	2.5 hours per job (ignores travel)	Actual Task time using distribution by product, MFL, skill and by outcome (completion/further) over time. Travel independently sampled from Actual distribution	DM/PM: Simplified – fluctuations are ignored so likely to underestimate necessary resource AM: Reflects reality accurately
Resource (FTE)	Created based on volumes – not "true" resource: focuses on % delta	Adjusted until base level calibrates (not true resource) with fixed split by 2011 system size – focuses on % delta	Actual resource by week by SOM	DM/PM: Approximately accurate, calculates the relative increase rather than absolute impact on man-hours. The baseline is not the "true" FTE supply in Openreach AM: Reflects reality accurately
Shrinkage	Not part of model	Not part of model	By category by week	DM/PM: Ignored – impact of weekly fluctuations of absences (sick, leave etc.) lost so likely to underestimate necessary resource AM: Reflects reality accurately
Rostering	Not part of model	10 hours per weekday (to fit 4 x 2.5 hr jobs), reduced Saturday level	Actual hours by time of day and day of week	DM: Ignored PM: Simplified to assume best case, in reality more complex jobs fall into the next day and have a knock-on effect on service AM: Reflects reality accurately
Skilling	Adds appropriate skill based on distribution shifts	Universal multi-skilling assumed	Actual skilling, with the ability to understand upskill impacts	DM: Approximately accurate PM: Inaccurate and operationally expensive, neglects the time, effort and cost to upskill and sustain all engineers to a competent multi-skilled level AM: Reflects reality accurately
Overtime	Implicit in task time/completion volumes	Not part of model	Uses overtime when required within configurable limits	DM: Approximately accurate PM: Effectively absorbed into Roster pattern – ignores operational fluctuations AM: Approximated based on size of and age of tail workstack – calibrates back to fluctuations in actual overtime
Glass Ceiling	Configurable – must be used to prevent unrealistic performance	Fixed (3-8%)	Implicit in data based on actual outcomes	DM/PM: specified by user – levels used suggest higher glass ceiling than Openreach's view which will underestimate resource to reach >90% levels of Repair AM: Actual glass ceiling by considering the reason for failure of every individual job

361. Based on the comparison shown above, Openreach is confident that the Allocation Model provides the most accurate simulation within a service organisation. The Allocation Model has the flexibility to closely replicate the assumptions used in the Resource Performance Model thereby allowing Openreach to understand the extent to which the more simplified assumptions impact on the increased resource required to meet a specific service level. In order to do this, the following adjustments were made to the Allocation Model:

- All engineers fully multi-skilled
- Four 2.5 hour timeslots each day Monday-Friday, 25% resource on a Saturday

- Zero shrinkage every week
- 50/50 SML mix – randomly sampled from SOM volumes each week
- MSL only volumes (excluding BBB/SFI, SMLs 3 & 4 and all other non-MSL activity)
- Minor failure rates (3.0% Repair, 3.6% Provision) built into visit rate distributions as needing an additional visit
- Major failure rates (3.0% Repair, 1.4% Provision) applied as automatic failures after the model has completed running
- Zero Assists
- Zero Travel time
- Zero chance of fault misdiagnosis (no resampling of MFL)
- Constant 2.5 Hours per completion & further
- Zero Overtime
- Priority based firstly when jobs due[124], secondly on when the job was logged (appointments are not prioritised over non-appointed jobs)
- Flat FTE

362. After making these changes, there still remains a few differences from the Resource Performance Model:

- Provision Volumes – we have not taken a UK level volume and split according to 2011/12 WSS. Instead we have used the actual spread of provision demand by SOM and by week[125]
- There is no ability in the Allocation Model to pair spare supply in one SOM patch with high demand in another simulating "patch loans"[126]
- There is no biasing mechanism within the Allocation Model to balance resource between Repair and Provision[127]

363. The Allocation Model was then configured in a similar way to how Analysys Mason configured the Resource Performance Model, by increasing the input FTE until the output met the actuals. More specifically, the precise number of FTE was found for each SOM that gave the closest output to the combined Repair SML1/SML2 actuals in 2015/16 – this was then used as the baseline.

124 Week-old tails are prioritised first (to make sure the tail workstack is appropriately managed), followed by work due on the day, tail work and then future work which is the same as the Allocation Model inputs

125 In "Analysys Mason report: Overview of the Quality-of-Service model and its outputs for WLR/LLU Charge Control 2017**"** it states "the realism of the modelling could be improved if the provisioning demand data were available in a more geographically granular form"

126 The omission of this feature is only likely to increase the base level of resource needed and according to the "Analysys Mason report: Overview of the Quality-of-Service model and its outputs for WLR/LLU Charge Control 2017" it states that "it is after all the delta from the base case performance that we are interested in, rather than the resourcing volume in the base case itself"

127 "Allocating resources between repair and provision" limitation described in the "Analysys Mason report: Overview of the Quality-of-Service model and its outputs for WLR/LLU Charge Control 2017"

Table 15: Actuals vs. Allocation Model Output using simplified input assumptions

	Actuals	Openreach Simplified Allocation Model	Difference
SML1	73.0%	72.7%	-0.3%
SML2	74.9%	74.8%	-0.1%
Provision	89.3%	94.2%	4.9%
Overall	**82.3%**	**83.7%**	**1.4%**

364. Following this alignment, the FTE is then increased in each SOM to understand the increase required to meet a certain service level. These results demonstrate a near linear relationship between resource uplift and service performance until the assumed glass ceiling is reached (Figure 35 below). In line with the approach taken by Analysys Mason, we have also examined the results for the worst performing GM (see Figure 36 below – and Table 16 for a summary of these results).

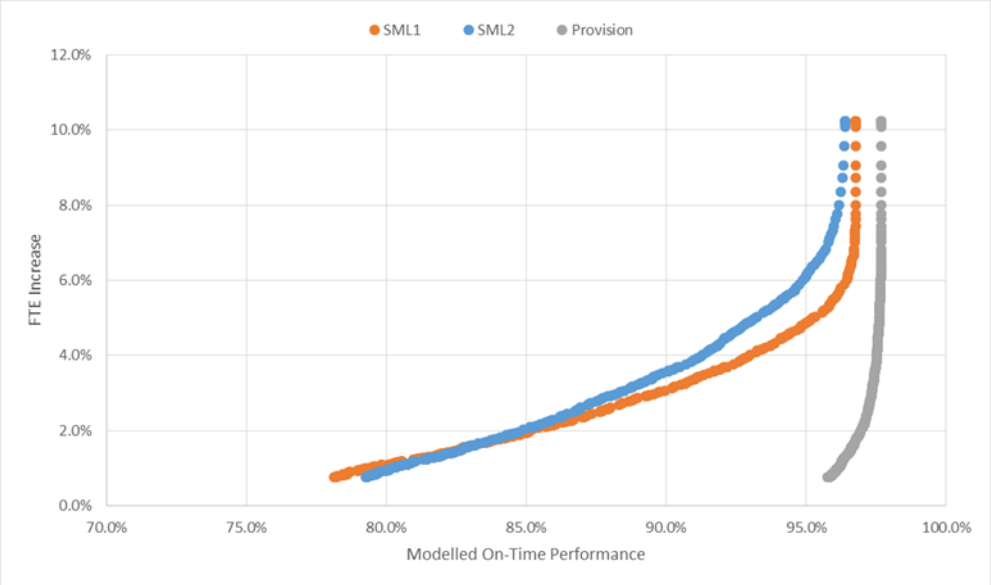


Figure 35: Resource uplift curve for UK using simplified input assumptions in the Allocation Model

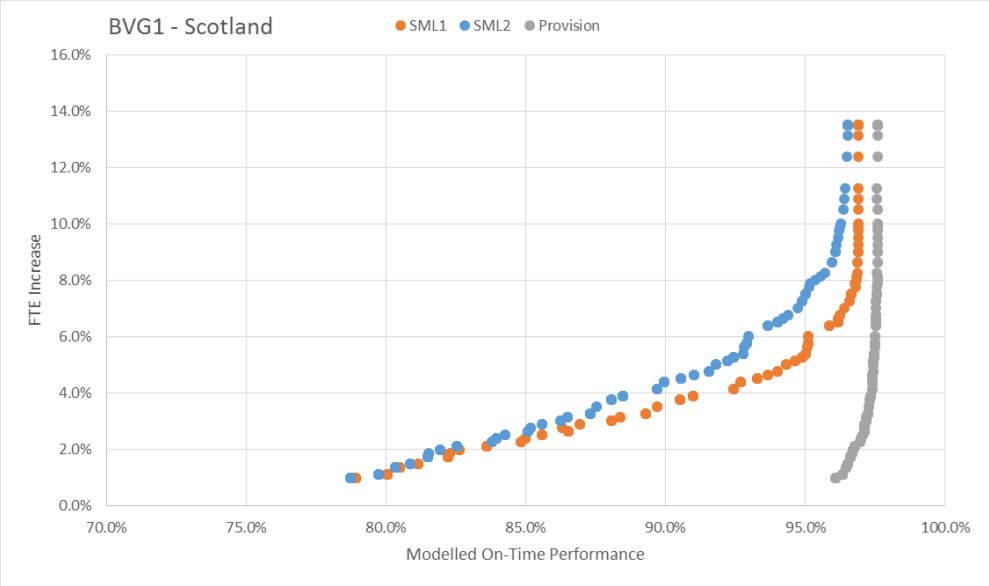


Figure 36: Resource uplift curve for worst-performing GM using simplified input assumptions in the Allocation Model

Table 16: Resource Uplift comparison for proposed Ofcom MSLs (pre MBORC allowance) with 50/50 SML Mix using Allocation Model output and simplified input assumptions

	Openreach Simplified Allocation Model (UK level)	Openreach Simplified Allocation Model (Worst GM)	Ofcom Resource Performance Model (Worst GM)
Year 1 (83%)	2.0%	2.8%	1.9%
Year 2 (90%)	4.1%	5.0%	3.8%
Year 3 (93%)	5.3%	6.5%	5.8%

365. We have also carried out sensitivity testing on the SML mix with these simplified input assumptions and compared to the Resource Performance Model with the results shown in Table 17 below. These results suggest that an all SML2 portfolio would need 1.3x more resource than all SML1 – compared to ~3.6x (i.e. 2.2% vs 8.0%)[128]. Moreover this highlights that there is little difference in necessary resource uplift between the current 2016/17 SML mix by geography and all SML2.

[128] Figure 1.2 in the "Analysys Mason report: Overview of the Quality-of-Service model and its outputs for WLR/LLU Charge Control 2017"

Table 17: Comparison of model results with changing SML mix (pre MBORC allowance)

	All SML1[129]			All SML2			2016/17 CL Mix[130]	
	Openreach Simplified Allocation Model		Ofcom Resource Performance Model	Openreach Simplified Allocation Model		Ofcom Resource Performance Model	Openreach Simplified Allocation Model	
	(UK level)	(Worst GM)	(Worst GM)	(UK level)	(Worst GM)	(Worst GM)	(UK level)	(Worst GM)
Year 3 (93%)	4.4%	4.9%	2.2%	5.4%	6.5%	8.0%	5.3%	6.4%

366. In "Analysys Mason report: Overview of the Quality-of-Service model and its outputs for WLR/LLU Charge Control 2017", it states that "it was necessary to reduce the proportion of repair minor fails from 5% to 3% such that the target of 93% repair performance was possible to achieve" and in Annex B sensitivity testing was done on the impact of this. We carried out similar testing with the Allocation Model using the simplified input assumptions and obtained the results shown in Table 18. The Resource Performance Model output suggests a 2% change in Repair Minor Fails moves the resource delta from 5.8% to 10.2% (i.e. 1.8x multiplier) in Year 3. However, the Openreach Simplified Allocation Model output increases the delta by 1.1x indicating that the Resource Performance Model is perhaps over-sensitive to changes in the assumptions.

Table 18: Results increasing Repair "minor fails" from 5% to 3% compared to Resource Performance Model (pre MBORC allowance)

	Openreach Simplified Allocation Model (UK level)	Openreach Simplified Allocation Model (Worst GM)	Ofcom Resource Performance Model (Worst GM)
Year 3 (93%)	6.4%	7.4%	10.2%

367. We have shown that using these simplified assumptions in the Allocation Model can produce similar results to the Resource Performance Model indicating that the methodology and technique flows through to the conclusions within the consultation.

368. However we will now go on to show that modelling in this way does not capture the complex dynamics of both supply and demand within a service organisation. The variability we experience and the breadth of the different types of work result in a much higher delta to achieve the uplift required.

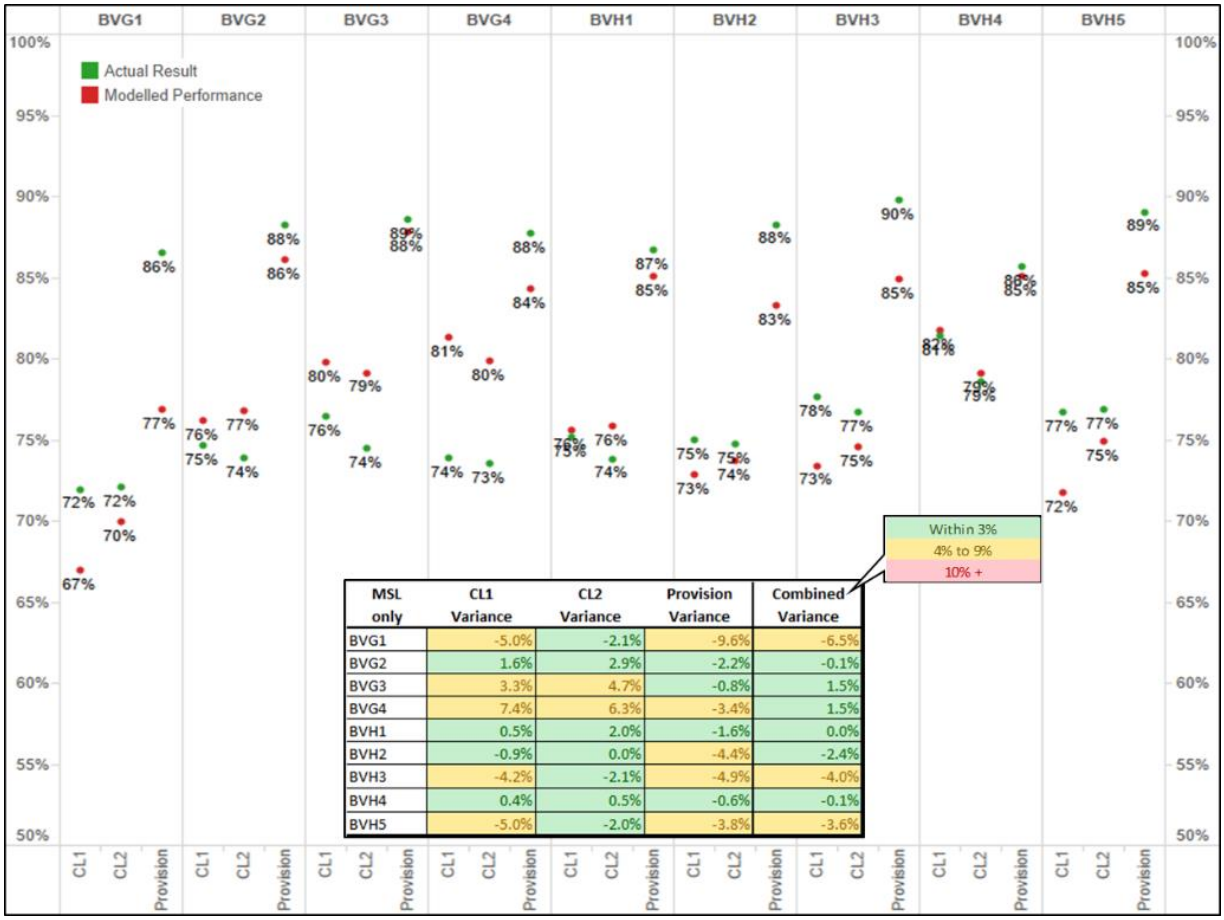
369. Openreach has carried out extensive calibration of the Allocation Model:
- We have ensured the Allocation Model accounts for the glass ceiling factors that impact on our ability to deliver service levels above 90%+ on repair.
- We have used actualised data (e.g. task times, visit and assist rates, travel times, FTE, skill profiles, shrinkage).
- We have run baseline scenarios building from SOM level up across all product sets (MSL and non-MSL) from Apr-2014 to Dec-2016.

[129] Saturday working has been switched off in the model for the All SML1 scenario as our agreements with the unions are based on the demand due on a Saturday (i.e. SML2)
[130] This reflects the CP migrations between SMLs seen in 2016/17 applied back to the 2015/16 baseline

- We are utilising the Allocation Model's capability for "stress factors"[131] to simulate where we have had to move operational levers at times of high intake - for example, increasing lead times to smooth the arrival profile of jobs. This will impact on our ability to deliver within SLA and is particularly evident in broadband repair. This has been used for calibration purposes only.
- The Allocation Model does not have a "patch loan" ability, therefore in order to account for loans in/out across SOMs and GMs we have used the shrinkage to adjust the engineer capacity each week – increasing shrinkage in the loaned from SOM and reducing in the loaned to SOM. This is based on the actual time spent on tasks by engineers who are working out of patch and as such replicates the unfamiliarity drag[132] we experience. The loan adjusted shrinkage is used for calibration purposes only, and shows close alignment at a GM and product level. Removing the loan adjustment the UK level calibrates to the same overall performance.
- The Allocation Model makes a simplifying assumption that the level of third party resource that currently supports an element of our simple provision activity remains constant. To meet the challenging service levels by 2020/21, the Allocation Model captures the direct labour recruitment and training needed to help meet the challenge to deliver more repair work on time. The Allocation Model reflects the increased proportion of our workforce that will be represented by direct labour.

370. Following successful calibration, we have assessed the accuracy of the Allocation Model against a base-case scenario. Breaking the MSL products[133] down to a GM level across the entire period from Apr-14 to Dec-16 there is close alignment across GMs, with combined Provision and Repair performance within 4% in 8 of the 9 GMs. Figure 37 (below) summarises the results obtained:

[131] See Annex 2 for more detailed explanation
[132] As described in "Resource sharing between regions" section of the Analysys Mason report
[133] MSL products refer to LLU MPF, WLR PSTN and GEA FTTC SML1 and SML2 faults only. The products specifically exclude SFI, FVA and Broadband Boost faults. SML2 business plus, 3 and 4 are also excluded. Any SML1 or 2 fault associated with SMPF, ISDN2, ISDN30 are also excluded.



MSL only	CL1 Variance	CL2 Variance	Provision Variance	Combined Variance
BVG1	-5.0%	-2.1%	-9.6%	-6.5%
BVG2	1.6%	2.9%	-2.2%	-0.1%
BVG3	3.3%	4.7%	-0.8%	1.5%
BVG4	7.4%	6.3%	-3.4%	1.5%
BVH1	0.5%	2.0%	-1.6%	0.0%
BVH2	-0.9%	0.0%	-4.4%	-2.4%
BVH3	-4.2%	-2.1%	-4.9%	-4.0%
BVH4	0.4%	0.5%	-0.6%	-0.1%
BVH5	-5.0%	-2.0%	-3.8%	-3.6%

Figure 37: Summary of Allocation Model calibrated baseline results (Modelled vs Actual)[134]

371. Using actual inputs, Figure 38 below shows our view of the uplift-service curve. This scenario applies to the 2015/16 base, but with the 2016/17 CP SML mix applied back to assess this impact. We have chosen to apply the current 1617 SML mix onto the 1516 volumes to quantify the reality of the operational impact of SMLs by geography.

372. Openreach is unable to recruit engineers straight to Underground (UG) or Broadband Underground (BBUG) level and we do not believe we could upskill and maintain everyone at a UG level due to engineer ability and choice. The skill mix for each year is as follows.

- Year 1: 75% UG/BBUG skilled, remaining Customer Access Line (CAL)
- Year 2: 90% UG/BBUG skilled, remaining CAL
- Year 3: 83% UG/BBUG[135] skilled, remaining CAL

[134] Openreach presentation to Ofcom: "Openreach Service Demand Modelling - Allocation Model"; 27th April 2017

[135] Note that the proportion of multi-skilled engineers is lower in Year 3 than Year 2 as we will be hiring more people who start out as CAL. This is outlined in more detail in 'Actual Resource Estimates' below

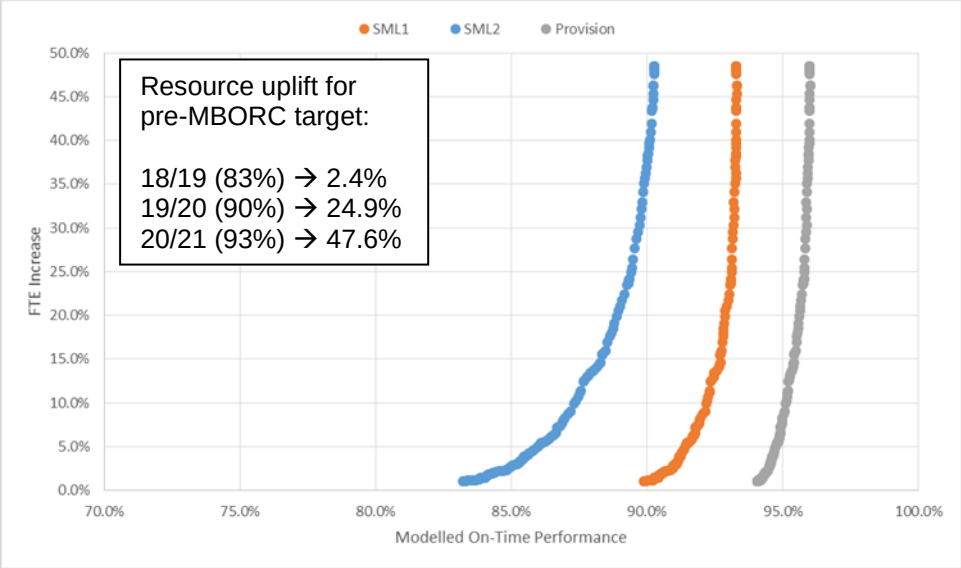


Figure 38: Service Impact of additional resource from the calibrated Allocation Model using 1617 SML mix on 1516 volumes (pre MBORC allowance)

373. Even with this level of increase, we are assuming the need to multi-skill a large proportion of our workforce (currently c. 66% are UG/BBUG skilled) which clearly has a significant associated cost. The cost is not only the cost of the training, but it is also time we lose off the field (both with the engineers being trained and buddying engineers), the cost of equipment and even following that we then see that it takes around 11 months for engineers to become fully competent. None of this has been considered as an overlay cost to the uplift (see *Actual Resource Estimates* below).

374. Table 19 (below) shows the extent to which using the simplified assumptions in the Allocation Model and the detailed dynamics impacts the resource vs cost curve. However we believe the calibrated Allocation Model using the true dynamics is the most representative of the impact within a complex service organisation.

Table 19: Comparison of resource uplift using actual supply and demand dynamics compared to simplified assumptions (pre MBORC allowance)

	Simplified Allocation Model (UK level)	Simplified Allocation Model (Worst GM)	Calibrated Allocation Model (UK level)
Year 1 (83%)	2.0%	2.8%	2.4%
Year 2 (90%)	4.1%	5.0%	24.9%
Year 3 (93%)	5.3%	6.5%	47.6%

375. We observe when reviewing the Allocation Model output in detail, and as can be seen in Figure 38, past 90% the resource increases substantially yet the majority of GMs still cannot reach the 93% MSL primarily due to the glass ceiling that exists.

376. To quantify the difference between the Resource Performance Model and Allocation Model we have used the simplified version of the Allocation Model and changed key input assumptions back to actual supply and demand dynamics used within the calibrated Allocation Model. [✂]

£[✂]

Figure 39:

377. [✂]

378. [✂]

379. [✂]

380. [✂]

381. In Question 5.4, we proposed an alternative repair MSL glidepath that represents a more reasonable, yet still very challenging, MSL. We have modelled this alternative glidepath and the results are shown in Table 20 (below).

Table 20: Comparison of resource uplift from calibrated Allocation Model using alternative glidepath compared to the Ofcom proposal

Pre-MBORC	83% / 90% / 93%	83% / 87% / 90%
Year 1	2.4%	2.4%
Year 2	24.9%	10.9%
Year 3	47.6%	24.9%

382. We have also carried out sensitivity testing on the SML mix within the calibrated Allocation Model. The result aligns closely to the simplified Allocation Model where the resource difference between an all SML1 and all SML2 mix is significantly lower than the output of the modelling carried out by Anlaysys Mason in the Resource Performance Model. The Year 3 comparison between an all SML1 and all SML2 mix across the three model outputs is shown in Table 21 below.

Table 21: Comparison of model resource impact/sensitivity based on SML mix (pre MBORC allowance)

	All SML1[136]			All SML2			Resource Impact		
Year 3 (93%)	Openreach Simplified Allocation Model (Worst GM)	Openreach Calibrated Allocation Model (UK level)	Ofcom Resource Performance Model (Worst GM)	Openreach Simplified Allocation Model (Worst GM)	Openreach Calibrated Allocation Model (UK level)	Ofcom Resource Performance Model (Worst GM)	Openreach Simplified Allocation Model (Worst GM)	Openreach Calibrated Allocation Model (UK level)	Ofcom Resource Performance Model (Worst GM)
	4.9%	36.0%	2.2%	6.5%	45.9%	8.0%	1.3x	1.3x	3.6x

383. We have commissioned Deloitte to conduct a review of Ofcom's Analysys Mason model and the Openreach allocation model in order to understand the differences in methodology, inputs and assumptions and the implications for the model results – see Annex 3.

384. Initial findings indicate that there are a number of areas in which the Analysys Mason model has less functionality and granularity than the Openreach allocation model, possibly due to time constraints in developing the model. As a result, the Analysys Mason model appears to make a number of simplifying assumptions; these include assuming a flat task completion time, constant resource levels across each week (i.e. not accounting for variability due to vacations, sickness or training), and universal multi-skilling amongst engineers. In contrast, the Openreach allocation model has the facility to capture variation in task time, travel time, skill requirements and the staff available.

385. An area in which our advisors believe the Analysys Mason model goes beyond the Openreach allocation model in capturing the realities of task allocation is in allowing a facility for lending resources between work areas. However, it is not clear from the evidence available whether the level of resource loans between regions implied within the Analysys Mason model is consistent with Openreach practices. In particular, the Analysys Mason model may understate the challenges and productivity costs associated with resource loans; in conjunction with the smoothing of task and travel times, this could lead to underestimation of the costs of managing peaks and troughs in demand and staff availability.

386. In addition to these differences in assumptions (which are largely a function of model capabilities), the two models also differ significantly in the assumptions made about the "Glass Ceiling", which is

[136] [✂]

a mechanism created to simulate difficult to control factors that in practice limit performance. Analysys Mason's sensitivity analysis indicates that their glass ceiling assumption is an important driver of model outputs. Analysys Mason acknowledge that in order to achieve the stipulated performance targets, the fault rate assumption (which drives the level of the glass ceiling) has had to be reduced below the rate suggested by either Ofcom or Openreach data. In addition, there is also a question about the extent to which presumed reductions in the fault rate are achievable.

387. **Openreach is confident that the Allocation Model provides the most accurate simulation within a service organisation and we believe it better reflects the underlying complexities that Openreach faces operationally. The Allocation Model results show that setting an MSL of 93%, rather than 90% in Year 3 increases the cost to support the higher service by £148m across the Charge Control period. We therefore believe the alternative glidepath, reaching a Year 3 repair MSL of 90% (87% post MBORC allowance) can be underpinned operationally and delivers a more appropriate, achievable and value-for-money outcome for industry and consumers[137].**

Actual Resource Estimates

388. We believe that Ofcom's cost modelling approach understates the level of investment needed to achieve the desired improvement in service performance to 93% by c. £[✂]m across the Charge Control period (as outlined in our response to Question 5.4). However, if the Openreach proposed glidepath to 90% is agreed then the cost associated is £[✂]m, compared to the Ofcom funding in the charge control model of £30m (a difference of £[✂]m). We believe that this is driven by the level of resource uplift needed being understated in the current modelling approach and no allowance being made for the incremental training costs needed. We also believe no allowance has been made for the investment in recruitment and training made in 2016/17 and 2017/18, above the base 2015/16 year, and this is essential to achieve the glidepath in the Charge Control period. We provide more detail on the impact of these factors below, but we believe not allowing for these factors means that the investment needed to achieve the improvements to service is not fully funded to give industry as a whole comfort that it can be achieved.

389. As outlined above, we believe that the Allocation Model provides a more representative forecast of the resource uplift needed to achieve the step change in quality of service proposed by Ofcom. The Allocation Model better reflects the dynamic relationship between demand and supply, and in particular the challenges faced at the higher end of the performance glide as service levels approach the inherent glass ceiling.

390. In addition, we believe that Ofcom does not adequately reflect the operational impact of the level of recruitment and upskilling that would be needed to achieve this improvement in service performance. The output from the Allocation Model suggests that we would need to recruit and train engineers at a rate that is significantly above the base year of 2015/16 and, although there will be a level of business as usual resourcing and skilling activity that is already reflected in the cost base, achieving and sustaining the supply dynamics needed has not been captured in the Ofcom modelling approach.

391. There are real cash costs associated with the training and recruitment needed that are not included

[137] See our responses to questions in section 5 above where we set out our concerns about compliance with Ofcom's statutory obligations.

in the current modelling. But there are also other factors that impact operational delivery and there is also an increased risk to customer service from aiming to do too much change too quickly. For example, an important element of the process to induct new recruits is the time our experienced engineers take to support ('buddy') their new colleagues and help them more quickly embed their skills. During this period we lose experienced engineering capacity and more time is taken to ensure that the new skills are developed and learnt.

392. Upskilling our existing workforce to support the improvements in service performance we are aiming to achieve over the next few years will also require thousands of experienced engineers to spend time in the classroom away from supporting customer service. Furthermore, there is an inherent performance and efficiency drag, when compared to the average performance implicit in any efficiency analysis, from any recently recruited or upskilled engineer as they develop their new skills. Based on analysis at an individual engineer level over several years, we believe this initial time to competence is around 11 months for a new recruit that is trained in basic repair skills and a further 3 months for any experienced engineer to embed additional UG or broadband skills.

393. We do not believe it is operationally practical to assume 100% of engineers are fully multi-skilled in line with the current Ofcom modelling because there will always be a community of new recruits each year that will be trained initially to undertake provision and simple repair work. It is only once these skills are embedded that we will look to give engineers full underground repair and broadband skills. There may also be a small number of equally valued engineers who will not become fully multi-skilled and instead specialise in provision and simpler repair work. We believe that these non-underground repair trained engineers will account for c. 15-20% of the reactive field engineering workforce at any time.

394. Between the 2015/16 base year and the start of the charge control period in 2018/19 we will have invested to upskill c. [✂] engineers. As a result of this investment, going into year one of the charge control we expect to have c. 75% of our field engineers multi-skilled to undertake underground repair work. To uplift this to 80-85% will require over [✂] additional engineers to be trained in underground repair and we believe it is appropriate to reflect these skilling assumptions in any service resourcing and cost modelling.

395. In assessing the financial impact of these factors, we have tried to understand the incremental costs associated with all of the higher levels of recruitment and training we have done since 2015/16 base year. However, whilst we believe the prior year investment is a key enabler to achieving the service levels in the charge control period, the initial focus is on the investment made between 2018/19 and 2020/21 to ensure it is comparable to the Ofcom modelling approach. We believe that the incremental cost that we will incur to underpin the Openreach proposed glidepath to 90% across Years 1-3 of the Charge Control is £[✂]m split between resourcing and training costs. This compares to the allowance in the Ofcom modelling of closer to £30m and represents an underfunding of the investment needed of c. £[✂]m.

396. This does not include the incremental investments above base year of 2015/16 that we have made ahead of 2018/19, but we anticipate this will be captured when Ofcom update the base year of 2016/17. We are investing further this year in incremental recruitment and upskilling, which will benefit industry throughout the charge control period, as we share the ambition to further improve service beyond this year. We believe that the investments across these two years are significant and would welcome the opportunity to discuss these with Ofcom as they form a key enabler to the higher levels of service we are aiming to achieve across the Charge Control period.

397. The additional cost across the charge control period amounts to £[✂]m. The additional resource required to achieve the service glide has been quantified based on the Allocation Model and equates to £[✂]m if we apply the resource uplift suggested by the Allocation Model and within the modelling methodology used by Ofcom. We believe that this understates the recruitment costs from lost capacity and impact on productivity by a further £[✂]m against the base year of 2015/16. There is then an additional cost of £[✂]m from the training required, that is driven by the higher costs associated with more highly skilled engineers (£[✂]m) and the lost capacity and impact on productivity as the engineers learn and embed new skills (£[✂]m).

Table 22: Additional cost impact to reach 90% repair performance (pre MBORC allowance) by 2020/21

£[✂]

398. In addition to the modelling of resource and skilling impact and the financial implications, we also believe that the Fault Rate assumptions that Ofcom has used in the Quality of Service modelling do not represent the latest Openreach position. We have made significant investments in proactive network maintenance last year and continue to learn from this and tailor our activity to ensure we achieve the best returns to customers and industry as a whole. Based on this ongoing review process, we believe that the marginal benefits from the higher levels of proactive maintenance we are undertaking every year are lower than previously assumed and which, in part, informed Ofcom's analysis. The impact of this is that we believe the assumed reduction in fault rate, and associated reduction in opex spend, is overstated and will mean that the work needed to deliver the repair service levels is underfunded by c. £[✂]m.

Summary

399. In summary we believe that the approach that Ofcom have taken to model the resource uplift needed to underpin the proposed service glide is sensible and, given the short time-frame available, provides a good view of the potential uplift whilst recognising the inherent limitations and simplifications of the approach. However, we believe that the Allocation Model that we have developed and are now able to draw on, is able to better reflect some of the underlying complexities that Openreach faces operationally. We believe that the unavoidable and understandable simplifications in the Ofcom modelling result in the true resource uplift being understated and this in turn will have consequences for Ofcom's assessment of both the achievability of step change

improvements in service levels and the costs associated in delivering them. We also believe that the simplifying assumption on the level of multi-skilling in the engineering workforce will mean Ofcom ignores a number of costs that Openreach will inevitably incur when delivering the uplift to the levels of resourcing and multiskilling.

Question 8.3: Do you agree with our proposals to direct BT to comply with performance standards regarding installations and repairs? Please provide reasons and evidence in support of your views

400. We agree with Ofcom's proposal to direct BT to comply with performance standards regarding installations and repairs. Our comments, concerns and where applicable alternative proposals relating to the performance standards Ofcom has specified are documented in our response to questions 5.1 to 5.8 for repair and questions 6.1 to 6.6 for provision.

Question 8.4: Do you agree with our proposals to direct BT to provide the KPIs we have specified? Please provide reasons and evidence in support of your views.

401. We agree with Ofcom's proposal to direct BT to provide and publish a set of KPIs to provide transparency as to our quality of service performance. Our comments and concerns relating to the KPIs Ofcom has specified are documented in our response to questions 7.1 and 7.2.

Question 8.5: Do you agree with our proposals concerning the regulatory obligations for SLAs and SLGs? Please provide reasons and evidence in support of your views

402. In summary Openreach agrees with Ofcom's proposals to re-impose a regulatory requirement on BT to include SLAs and SLGs linked to specific services in its Reference Offer for specific forms of network access and, as a consequence, not to re-impose the 2008 SLG Directions. This approach also continues to allow SLAs and SLGs to be negotiated by industry rather than imposed by regulation. The OTA2's role of facilitation of SLA/SLG negotiation has been highly effective since the process was set up as part of the FAMR and should continue during this next market review period. However, as detailed below, we do not agree with the removal of the 60-day cap (and we have a concern regarding a specific SLA/SLG for ISDN30).

Removal of 60 day cap

403. Openreach does not agree with the removal of the SLG compensation cap present in the LLU, GEA and WLR3 contracts as proposed by Ofcom in the Consultation Document.

404. It is normal commercial practice to include a cap on compensation payments in any SLA contained within a commercial contract so that any liability is not open ended or unlimited. As noted by Ofcom[138], caps apply in certain circumstances in the electricity and gas sectors.

405. Notwithstanding the above, all three contracts contain provisions which allow the CPs to claim for additional financial loss associated with specific breaches beyond the level of the cap contained within the SLAs. Therefore we believe that CPs already have a mechanism to make claims where they are above the relevant SLG cap. On this basis, we do not believe the removal of the proposed cap is objectively justified[139].

[138] https://www.ofcom.org.uk/consultations-and-statements/category-1/automatic-compensation paragraph 8.21
[139] The Act, section 47

406. Ofcom considered removing the cap on compensation in 2008, in its review of BT's SLGs, but on balance decided not to do so because it recognised that the absence of caps can create uncertainty. Ofcom specifically stated that it "*acknowledges that caps limiting exposure to compensation – even set at a level where they are unlikely to bite – aid certainty and provide a level of transparency to both parties subject to the contract*[140]". Ofcom was also mindful at the time of not introducing unreasonable burdens on Openreach[141].

407. There has been no change since then to warrant the removal of this cap. Indeed, recent investment by Openreach and further improvements, actually suggests there is even less of a case for the removal of such a cap now, further undermining the objective justification for the removal of the cap. In addition, given as set out above, there already is a mechanism through which CPs can recover loss for late repair and installation (past 60 days), which in combination with SLG compensation for 60 days, already incentivises Openreach to provide improved quality of service, we do not believe the removal of the cap is proportionate[142]. The existing arrangements are more proportionate and still sufficiently protect CPs whilst incentivising Openreach.

Proposed Appointment Availability SLA/SLG for ISDN30

408. Condition 6 6.2B1 (ISDN30) (a)(i) availability of an appointment for the provision of the service. We do not currently have an appointment availability SLA/SLG for ISDN30 due to the complex nature of the product. The provision of ISDN30 requires detailed planning and bearer installation prior to the circuits being commissioned and brought into service. Currently no appointments are offered to the CP to select via the dialogue service, the orders are driven by the customer required by date (CRD) and minimum lead time of 20 days. We therefore consider that this new entry should be deleted.

Question 8.6: Do you agree with our proposals regarding the conduct of, and principles and criteria to be applied to, contractual negotiations concerning SLAs/SLGs? Please provide reasons and evidence in support of your views.

409. Openreach continues to support the process put in place via Ofcom's FAMR Statement in relation to negotiating SLAs and SLGs. This has been a highly effective process, as facilitated by OTA2, in enhancing and launching a wider range of SLAs and SLGs - over 20 SLAs/SLGs have been discussed resulting in 17 either new or enhanced SLAs/SLGs being put in place. The evolution of these requirements recognise that the suite of SLAs and SLGs put in place in 2008 where during a time when the market was very different. Openreach has played a highly proactive role in the negotiations and been responsive to requests.

410. Recognising the success of the current process, which is based upon the application of the principles identified in Table 8.9 of the Consultation Document and the criteria for the assessment of the SLA/SLG requests as shown in Table 8.10 of the Consultation Document, we see no case for further regulatory intervention. Openreach therefore endorses Ofcom's proposals regarding the conduct of, and principles and criteria to be applied to, contractual negotiations concerning SLAs/SLGs.

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[140] https://www.ofcom.org.uk/__data/assets/pdf_file/0020/33617/statement.pdf paragraph 3.37
[141] https://www.ofcom.org.uk/__data/assets/pdf_file/0020/33617/statement.pdf paragraphs 4.21 and 5.22
[142] The Act, section 47

Annexes

Annex 1: Glass Ceiling Definitions

Annex 2: Allocation Model Description

Annex 3: The Report by Deloitte

Annex 1: Glass Ceiling Definitions

Exclusions from Glass ceiling :- Non repair work, Faults not raised by CPs, Faults cancelled by the CP, Faults not included in the RD3 measure		
Class ceiling grouping	**Description**	**Definition**
Met SLA	Job passed it RD3 target	RD3 success
Resource	Job failed due to lack of field resource available on time with right skills.	First time issue or incomplete further is after CCD
Other	Job which fails for any reason not listed here	Not included in any other definition
Engineer Out of Time	Engineer did not have sufficient time to complete the task.	Task furthered as 'Out of Time'
Common fault found	Tasks that were allocated to an engineer but were subsequently identified as part of a common fault scenario that had not been identified when the fault was raised.	Task furthered as 'Common Fault'
CP Access - Appointed	When an appointment has been arranged with the end customer but the customer is not available or present at the premises in the appointment slot.	Job has an appointment with a 'No Access' further
Assists	Job which failed as we were unable to provide the primary engineer with the required support within the SLA time frame.	Task furthered as 'Assist'
Different skilled Engineer	The fault was diagnosed to a specific network location (i.e. underground) however the attending engineer did not have the necessary skills to complete and therefore had to return for an appropriately skilled engineer.	Task furthered for a specified skill which the attending engineer does not have.
Hoist required	Faults in the overhead network that cannot be progressed as a hoist is required which cannot be sourced on the day.	Work has been passed to a hoist skill once during the fault
Exchange equipment issue	The job had an issue in the exchange outside Openreach's network so has to be passed to TSO to resolve.	Task furthered as 'Exchange'
Damage customer Home	A damage report within the customer's premises such as overhead network during building work or cut cable through garden work	Fault report code is customer damage (DRW)
Specialist skill required	The repair required a special skill to progress (i.e. Track and Locate) which could not be identified prior to engineering visit	Task furthered as requiring a defined specialist skill
Specialist tools/stores required	The repair required specialist tools or stores to restore service that could not be identified prior to engineering visit	Task furthered as requiring specialist stores/tools
No engineer visit required	Jobs which did not have an associated engineering visit however failed RD3	The job has no engineering visits associated with the fault
Common to Complex fault	Tasks that were allocated to an engineer but were subsequently identified as part of a complex fault resolution that required Civils / Auxiliary work to resolve	The fault is noted as common and has a network solution clear.
Rejected Clear	WLR3 and NGA jobs which have been closed and subsequently rejected by the CP creating an RD3 failure	Fault has a Clear Reject KCI
Long Duration Work	Job which have more than 6 hours of engineering time associated which has resulted in an RD3 failure	Sum of engineering task time is greater than 6 hours
CP Access – Non-appointed	Faults diagnosed as network-based (non-appointed) that are subsequently proved into the customer domain and the engineer is unable to progress through no access to the premises.	Job is incomplete further as No Access with no initial appointment
Unexpected Hoist	Fault resolution requires a hoist where the network is not in standard overhead location, or has multiple hoist requirements which could not be anticipated	Work has been passed to a hoist skill more than once, or is located in at the customer premise.
Engineer access Obstructed	Engineer was unable to complete repair task due to issues preventing access to BT plant which is outside the customer's premises or control (i.e. parked vehicle prevents access to a pole or carriageway box)	Task furthered as 'No Access Line Plant'
Network damage	A damage report within the Openreach network such as a cable strike through digging / ploughing or overhead cables damaged by high vehicles	Fault report code is Network damage (DRU / DRO)
Safety Hazard stops work	Repair that cannot be competed due to a safety grounds lined to a hazard (i.e. environment, animals, equipment or behaviour)	Task furthered as 'Hazard'
Needs Civil Engineering	Line plant needs to be accessed, repaired or replaced via a planned solution requiring activity outside the engineer's on the day remit. This includes Survey assessments and Planning solutions linked to Maintenance Dig, Duct Work, Traffic Management, Water Pumps, Generators, Desilting and Tree Cutting	The fault has is furthered incomplete to a Network Solution queue.

Annex 2: Allocation Model Description

Openreach Service Demand Modelling: Allocation Model

Model overview and methodology

June 2017

Building a better working world

Introduction

1.1 Ofcom is currently conducting its Wholesale Local Access ("WLA")[143] market review, in which it will set regulated charges for Metallic Path Facility ("MPF")[144] and Virtual Unbundled Local Access ("VULA") products applicable from 1 April 2018. These wholesale products are used by Openreach's Communication Provider ("CP") customers to provide standard and superfast broadband services to end users (by using MPF and VULA respectively). In order to provide VULA, Openreach offers the Generic Ethernet Access ("GEA") product which provides CPs access to BT's Fibre to the Cabinet ("FTTC") and Fibre to the Premise ("FTTP") network.

1.2 Ofcom has also recently undertaken a consultation as part of the market review for Fixed Narrowband[145] products in which it will, *inter alia*, set regulated charges for Wholesale Line Rental ("WLR") products from 1 October 2017.

1.3 Related to both of these market reviews, Ofcom is currently conducting a consultation on the quality of service for WLR, MPF and GEA products (the "Consultation").[146] These products are dependent on the copper access lines between Openreach street cabinets and customer premises, and therefore Ofcom is considering the quality of service for these products as a group. The costs associated with Provision and Repair[147] activities relating to these copper access lines need to be apportioned between the relevant wholesale products as an input to Ofcom's charge control modelling.

1.4 As part of the Consultation, Ofcom is considering a number of aspects of Openreach's service quality and cost base, including Service Level Agreement ("SLA") and Service Level Guarantee ("SLG") arrangements[148], the minimum service standards for Provision and Repair activities, and the different levels of resource required to provide differential Repair performance (referred to as "Care Levels" by Openreach[149]). Ofcom recognises that revising service standards potentially has implications for Openreach's costs.

1.5 To inform its proposals, Ofcom relied primarily upon a model developed by Analysys Mason, its consultants. Ofcom states that this model (referred to as the "Resource Performance Model") *"uses a high-level simulation of Openreach's field operations to estimate the proportion of fault repair and installation order activities that will meet specified service standards for a given level of resources."*[150]

Background

1.6 In this context, EY was engaged by Openreach to develop a model (the "Allocation Model") that could be used to model the impact on Openreach's field force of providing service at different levels of performance.[151]

1.7 EY delivered the Allocation Model to Openreach in early 2017. Openreach undertook an extensive model testing exercise, which included calibration of the modelled results with actual

[143] https://www.ofcom.org.uk/consultations-and-statements/category-1/wholesale-local-access-market-review
[144] Also referred to as Local Loop Unbundling ("LLU")
[145] https://www.ofcom.org.uk/consultations-and-statements/category-1/narrowband-market-review
[146] https://www.ofcom.org.uk/consultations-and-statements/category-1/quality-of-service
[147] The primary field activities, and hence costs, relating to these products are Provision (providing a working customer access line to new customers) and Repair (responding to line faults)
[148] SLAs cover the maximum time available to Openreach to complete a Repair activity or the lead-time to the earliest Provision appointment date offered. SLGs represent the charges that Openreach is liable to pay to other Communications Providers in the event it fails to meet a SLA for a particular Provision or Repair activity
[149] Openreach offers four Care Levels for Repair, with Care Level 1 being the most basic (with the longest SLA target), and Care Level 4 the most stringent (and hence with the shortest SLA target)
[150] Ofcom, Quality of Service for WLR, MPF and GEA, 31 March 2017, §A7.2
[151] EY previously developed a model in conjunction with Openreach, the outputs of which were used by Ofcom to inform the setting of the charge controls in the 2014 Fixed Access Market Review

performance using historical data. EY provided ongoing support to Openreach as part of this exercise, including additional model development.

1.8 Openreach has subsequently run scenarios to estimate the impact on required resource levels for, e.g., different service standards for Provision and Repair. The results of these scenarios have been shared with Ofcom by Openreach, and are not presented in this document.

1.9 Openreach considers that the Allocation Model represents the most accurate reflection of how jobs are allocated and how service is actually delivered in its business. In keeping with this view, Openreach plans to use the Allocation Model for operational purposes within its Service Delivery team, for the purposes of resource planning.

Scope of this report

1.10 The objective of this report is to provide an overview of the Allocation Model methodology and approach. Openreach has conducted its own analysis using the model, including an exercise to calibrate modelled results to historical actuals, and the development of a a number of scenarios to show the relationship between resource levels and service performance The results of scenarios undertaken in the Allocation Model have been shared with Ofcom by Openreach.

1.11 The remainder of this report is structured as follows:

- Section 2 provides an overview of the model scope and objectives, as well as the approach used to develop the Allocation Model; and
- Section 3 details the inputs employed, the individual calculation steps and the model outputs.

2. Modelling approach

Model scope

2.1 The Openreach operational business is comprised of three delivery teams:[152] Service Delivery ("SD"); Business and Corporate Delivery ("BCD"); and Infrastructure Delivery ("ID"). The scope of the Allocation Model only considers activities conducted by the SD team, as it is this team which is responsible for the Provision and Repair of the products considered in the market reviews for WLA and Fixed Narrowband products.[153] The SD team employs around 19,000 staff, comprised predominantly of field engineers. There is no activity overlap between SD and other Openreach delivery teams as engineers need to have the appropriate skills and training to undertake SD activities.

2.2 The Allocation Model includes all activities undertaken by the SD field engineers which require an engineering visit. Service Enablement (or "Frame") activities, which occur solely within local exchanges, have been excluded as, in most areas of the country, they are undertaken by a distinct team of engineers and/or do not require a visit from an engineer.[154]

2.3 Engineers who undertake "Network Solutions" activities have also been excluded from the model. Network Solutions include more complex networking activities such as the installation of CCTV systems or the repositioning of poles and drop-wires to accommodate building redevelopments. These activities have been excluded as they are unrelated to the Provision and Repair of the products relevant to the Consultation and there is no activity overlap between the engineers which undertake the respective activities.

2.4 In practice a number of jobs are completed by external contractors (and not Openreach employees). These are removed from weekly job volumes, and not considered within the scope of the Allocation Model. This is because the weekly profile of contracted jobs is fairly static across the year and is based on contractual agreements rather than job volumes.

Model objective

2.5 The objective of the Allocation Model is to understand the relationship between quality of service and the available resource (i.e., the number of full time equivalent ("FTE") field engineers). This can be used to derive the costs required to deliver a given level of service performance. The Allocation Model is hence designed to address the key questions of:

Supply side

- How do increases/decreases in the number of field engineers impact service performance?
- How do changes in service level definitions impact the relationship between resources and service performance?
- How do changes to job prioritisation rules impact service performance?
- How do different approaches to managing "Tail jobs" (jobs that are not completed within the completion target) impact service performance?

[152] Openreach also has a Head Office team which includes the Executive management team and centralised functions such as Finance and Human Resources

[153] The BCD team is responsible for the provision and repair of business connectivity products such as Ethernet lines. The ID team is responsible for providing and maintaining the copper and fibre network and infrastructure which supports Openreach products and services. SD jobs are exclusively executed by SD staff and it is therefore appropriate to model this team in isolation, rather than develop a model which incorporates Openreach in its entirety

[154] In operational areas where the Service Enablement team is not distinct (some parts of Scotland, Wessex and Cornwall), the availability of engineers is reduced to account for these activities

Demand side

- How does a change in Care Level mix impact service performance?
- How do changes in the product mix impact service performance?
- How do changes in the volume of Provision and Repair jobs impact service performance?

2.6 As discussed above, in addition to supporting its submissions to Ofcom as part of the Consultation, Openreach also plans to incorporate the Allocation Model into its own operational planning process. Therefore, a key objective of the Allocation Model is to inform Openreach's understanding of how the relationship between resource and quality of service may evolve as a result of changes to its business. Such potential changes include, for example, a reduction in volumes of MPF and WLR lines and an increase in volume of GEA lines as a result of increasing uptake of superfast broadband services.

2.7 In order to be an effective planning tool, the Allocation Model has been designed to include the key parameters that affect service performance, and accurately model how these parameters interact in a manner similar to the "real world" operations of the Openreach business. The relationship between resources and service performance is complex as SD is a large organisation with a broad portfolio of products, including those with a defined Minimum Service Level ("MSL") and those without a MSL.[155] In order to reflect the complexity of this relationship within the SD team, the Allocation Model considers:

- The full breadth of the SD product portfolio including both products with a defined MSL such as WLR, as well as those without an MSL such as Broadband Boost ("BBB") or Special Fault Investigation ("SFI");[156]
- Different MSL products (WLR, MPF, GEA) with different Care Levels and different fault rates;
- Different types of jobs (Provision, Repair);
- Different types of faults (e.g., faults at different points of the line, or at the customer premise);
- The distribution of jobs over time;
- Complexity of jobs, i.e., those which may require multiple visits or specialist skills;
- How Openreach allocates and prioritises jobs;
- How Tail jobs are addressed; and
- The number of available SD engineers by skill level (skill levels refer to grading of engineers based on their expertise).

[155] The SD team serves a diverse and geographically dispersed customer base. Openreach customers include downstream BT Lines of Business ("LOBs") and external CPs. This requires a complex resource planning function within Openreach to optimise the allocation of resources to address an uneven pattern of demand for: (i) Provision activity, which is driven by CP requirements; and (ii) Repair activity, the demand for which is by its nature uncertain and can be influenced by exogenous factors both in terms of peak demand on resource and in geographical variability. For example, if a storm creates the need for additional resources to repair faults in a given period in a given area, Openreach is required to respond with existing available resources. Openreach is unable to accurately forecast such events due to the inherent uncertainty of both weather forecasts and the subsequent variability of the impact on the network. Hence, resourcing in advance for peaks in demand at a local level is a complex exercise

[156] See Appendix A for a full list of the products included in the model

Model logic

2.8 The Allocation Model is a Discrete Event Simulation ("DES") model. DES models mimic the operation of a real or proposed system, in this case being the day-to-day operations and activities of Openreach SD engineers.

Overview of allocation model logic

2.9 The Allocation Model is a "bottom-up" workforce simulation/queuing model.[157] It takes the available engineering resource and detailed product and job specific parameters as inputs, and then can be used to model the relevant quality of service outcomes (e.g., the proportion of jobs which are completed within the defined SLA). It simulates the allocation and prioritisation of jobs in the workstack to engineers and simulates the completion or non-completion of tasks.

2.10 The Allocation Model processes individual jobs through the "system" and assigns each job with characteristics and task times[158] sampled from probability distributions. The probability distributions are generated from historical Openreach data, and can then be modified when running scenarios to investigate the resulting impact on performance and engineer utilisation.

2.11 The Allocation Model can model differences in Care Level mix, variations in task time, variations in job visit rates (reflecting that some jobs require multiple visits), job backlogs and other supply and demand parameters. The result is a model that reflects the 'multi-visit' nature of service delivery dynamics and also allows for modelling of discrete variables e.g., the upskilling of engineering staff.

2.12 The Allocation Model underwent an extensive comparison and calibration exercise to ensure that it accurately modelled the different supply and demand side dynamics faced by Openreach to ensure that it was suitable for its internal operational use.

Geographic scope

2.13 EY initially developed the Allocation Model to consider Openreach's operations at a General Manager ("GM") geographic area level, of which there are nine, comprising different areas within England, Wales and Scotland. Northern Ireland is excluded as this geographic area is not served by the Openreach organisation.

2.14 Openreach, with support from EY, has subsequently developed the model to produce outputs at a more granular Senior Operations Manager ("SOM") area level, of which there are 56, comprising smaller geographic areas within each GM area. The GM areas defined in the model are reflective of the SOM areas which comprise them.

Granularity of modelling assumptions

2.15 In developing the Allocation Model, EY and Openreach have sought to strike an appropriate balance between accuracy and practicality. Hence, the objective has been to develop a model that can closely simulate outcomes in the "real world", but one that also recognises that any modelling exercise has limitations. For example, weekly inputs relating to the number of available engineers were averaged across monthly periods and task times were averaged across quarterly periods. EY and Openreach considered that this was a pragmatic approach to

[157] DES models can either be based on a "distribution approach" or an "allocation approach". The Allocation Model uses an allocation approach whereby the available number of resources is the input, and the resulting performance is the output. Such an approach is considered as the more "traditional" approach to DES modelling. In contrast, distribution models are "top-down" in nature and use the desired performance level as an input, with the output representing the relative increase/decrease in resources needed to meet the desired performance level

[158] Task times are comprised of both the time for an engineer to travel to a customer visit and the time relating to the engineer undertaking activities during the visit

ensure that scenario outputs are broadly consistent with operational reality and not skewed by potential outliers in more granular input data.

2.16 As a consequence, a number of simplifying assumptions were adopted. For example, the model measures the proportion of appointed jobs that are actually completed on the agreed customer completion date ("CCD") rather than simulating the availability of appointments for Provision jobs, which would enable the measurement of performance against the First Available Date ("FAD") MSL. .

2.17 Further, the Allocation Model considers that each SOM area operates independently, i.e., engineers are not loaned between areas to meet peaks of demand. In reality engineers do, on occasion, work outside their assigned SOM area (known as "patch loans"), particularly where there exist significant differences in activity levels between SOM areas.[159] The model does not have the ability to directly model these patch loans.

2.18 Therefore, as part of the model calibration exercise undertaken by Openreach, in order to account for loans in/out across SOMs and GMs, a parameter was developed to model "shrinkage."[160] This allows the user to adjust the engineer capacity each week; for example, increasing shrinkage in the SOM area from which the resource is loaned and reducing shrinkage in the SOM area which receives the resource. EY understands that while Openreach used this parameter as part of the calibration process, it was not applied in the scenarios shared with Ofcom to make the scenarios more comparable.

Reprioritisation functionality to account for "high stress" periods

2.19 The Allocation Model has been built with the functionality to allow the adjustment of the job prioritisation rules. This model functionality was developed to reflect that during periods of high activity, known as "high stress" periods, operational decisions are made by Openreach to adjust prioritisation. This functionality provides the capability to simulate this response, for example, allowing modelling of the fact that Openreach could reduce the number of slots available for Provision appointments and/or de-prioritise BBB and SFI services relative to Repairs.

2.20 The current stress on the SD team is measured at the outset of each week in the model by evaluating the projected supply of engineers compared to the "workstack"[161] demand.

2.21 The stress factor is calculated as follows:

- Where any resource shortfall exists, the stress factor is the total shortfall as a percentage of the projected man hours required. This will be a positive value; and
- Where any resource surplus exists (and no shortfall exists), the stress factor is the total surplus as a percentage of the projected man hours required. This will be a negative value.

2.22 The model will then adapt the standard mode of operation in response to the stress factor crossing a threshold. The standard mode of operation is reinstated once the stress factor falls below the set threshold. Stress factor thresholds can be set independently for:

- Shrinkage;

[159] For example, these "Patch Loans" typically occur where an individual SOM may be experiencing high levels of Repair activity, and therefore additional resource is assigned to that SOM area for a limited period to assist in the management of that activity

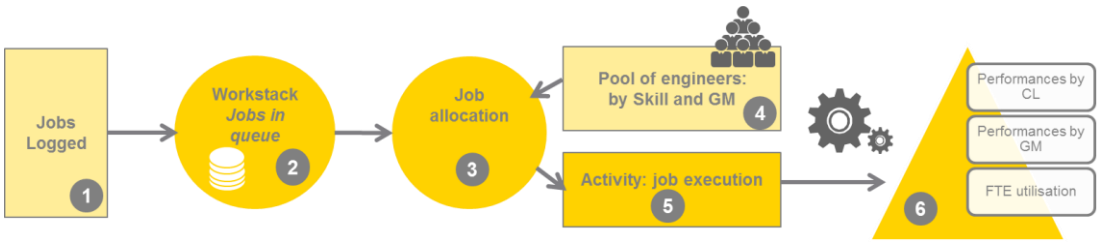
[160] Shrinkage includes annual leave, sickness, training, planned maintenance and other activities that would take an engineer out of the field for a short period of time. A single percentage value is used to represent total shrinkage across these categories for each week of the year. This percentage is applied uniformly across the skill set to reduce the overall headcount across each day of the week

[161] The workstack refers to the queue of jobs awaiting completion

- Customer appointment uptake;
- Job prioritisation rules; and
- The clearing of Tail jobs (which is equivalent to increasing/decreasing the level of overtime).

3. Allocation Model overview

3.1 The schematic below details a high level overview of the Allocation Model:



3.2 In this section, we set out details of the inputs, model logic, calculations and outputs in respect of Steps 1 to 6 in the schematic above.

Step 1 - Jobs logged

3.3 The key input into the allocation model is the throughput of jobs. The starting point is the actual number of jobs by product, by GM/SOM area, and by week for the given base year (e.g., 2015/16). From this data a set of distributions are generated. These reflect the number of jobs arriving each day, and their respective characteristics.

3.4 The jobs "enter" the model and are then assigned a number of characteristics by sampling from the respective distributions:

- **Categorisation (Product, Main Fault Location ("MFL"), Care Level, Appointed/Non-appointed jobs[162]):** a job category is defined for each feasible combination of product, MFL, Care Level and appointment status. A frequency distribution by week of the year is sampled to determine the product, MFL, Care Level and appointment status of the job;

- **Logged time:** a distribution dependent on the job's Care Level is sampled to determine the week, day and hour of the job's logged time. A uniform distribution is used to distribute jobs by minute within each hour;

- **Appointment Time (accepted by the customer):** a frequency distribution based on the job's Care Level, the day of the week the job is logged, and the time of day that the job was logged is sampled to determine the appointment time agreed by the customer; and

- **Total Visits:** a frequency distribution dependent on the MFL is sampled to determine the total number of visits required to complete each job. If a job requires more than one visit, the MFL is resampled for the second visit. This MFL will be applied to the second (and all subsequent) visits. Total visits are capped at four, as, according to Openreach data, only a small proportion of jobs require five or more visits.

3.5 The frequency distributions used to assign each of these characteristics to jobs are derived from actual historic Openreach data. The model uses the weekly distribution of job volumes by product, Care Level, MFL and appointment status and the weekly distribution of jobs by Care Level, day of the week and hour of the day to determine the frequency distributions. Therefore, while the model does not use the actual individual jobs and their characteristics in the simulation,

[162] Appointed jobs are those with a time and date agreed with the customer

in aggregate across any week, the number of each type of job, and the physical location where it occurred, will be equal to the actual recorded number, location and type of job.

3.6 The category of jobs known as "Simultaneous Provide" (e.g., fibre and copper provision) are undertaken at the same time by the same engineer. The two jobs are therefore combined into a single job in the Allocation Model. All relevant distributions (such as task times) are based on this combined job and categorised under the copper MSL category with an MFL of "SIM". Following the running of the model, the Simultaneous Provide outcome is replicated into the GEA MSL category. The job is therefore reflected in the service performance of both products, but the resource required to complete the job is only counted once.

Step 2 - Workstack jobs in queue

3.7 On entering the model, the jobs enter a "queue" or a workstack. The position of each job in the queue is determined by the job's characteristics and a defined set of prioritisation rules.

3.8 Jobs are prioritised in the model in the following order according to a (flexible) priority scoring framework which is consistent with Openreach's actual prioritisation rules outside of high stress periods. For the base scenario the priority ordering is as follows:

1. Care Levels 3 and 4 jobs (those with the most stringent SLA targets);
2. Appointed jobs;
3. Tail jobs more than a week old (i.e., those which are already a week beyond their targeted completion date);
4. Due jobs;
5. Tail jobs less than a week old; and
6. Future jobs (non-appointed jobs and those with no immediate completion date).

3.9 The prioritisation rules distinguish between jobs that are subject to an MSL (e.g., WLR and MPF), and those that are not subject to an MSL (e.g., BBB). Jobs that are not subject to an MSL are lowest priority (i.e., below Future jobs) unless they are in the Tail e.g., Tail non-MSL jobs are still ahead of Future MSL jobs.

3.10 The priority scoring framework is comprised of four components:

1. The Care Level associated with the job;
2. The appointment status;
3. The number of days to the target completion date for the job; and
4. Product.

3.11 A "score" for each component is calculated for each job and summed to form a total priority score. Jobs with a higher score have a higher priority in the queue. Where two jobs have the same priority score, the job with the earliest logged time takes priority. This is consistent with how the scheduler works within SD.

Step 3 - Job allocation

3.12 The job MFL determines the minimum skill required by an engineer to complete the job. The jobs are allocated in priority order and each job visit is allocated to the first available engineer with the lowest feasible skill set. This replicates how Openreach allocates its jobs in practice, and ensures that the engineer skill level matches the job, and that highly skilled engineers are not assigned to jobs with a relatively low skill requirement.

3.13 The number of engineers is set for each GM or SOM and form a "pool" of available resource. The engineer is taken out of the pool when undertaking a visit, and then returns to the pool when the visit is completed.

Step 4 - Pool of engineers: by Skill and GM

3.14 A base engineer is assumed to work a 36 hour week (plus five 40 minute lunch breaks across the week). The number of engineers with a specific skill set is derived from a set of percentage distributions derived from actual data for the relevant period. Any observed increase (hiring) or decrease (attrition) within a skill set over time is modelled to occur in the week in which it occurred. The available pool of engineers is also modified to reflect shrinkage (e.g., sick leave).

3.15 The following skill categories are used to group engineers (from highest to lowest skill level):

1. **Broadband Underground ("BBUG"):** multi-skilled underground engineers with broadband skills;

2. **Underground ("UG"):** multi-skilled underground engineers, also referred to as Customer Service Engineers ("CSE");

3. **Customer Access Line ("CAL"):** basic Repair and Provision engineers; and

4. **One Man Installer ("OMI"):** Provision only engineers.

3.16 No distinction is made between levels of experience within each skill set. There is, however, the ability to model scenarios which change the mix of skills within the workforce, and reflect the timing of when the upskilling occurs.[163]

3.17 A weekly capacity profile is used to determine the headcount of each skill category by weekday and time of day. To reflect any fall in daily headcount as a result of shift patterns, engineers that are not currently allocated to visits are removed first from the pool of engineers. If further resource reductions are required in order to meet the capacity profile, engineers which have been most recently allocated to visits are removed. Any time incurred relating to these visits will be removed from the calculation and the visit will be put back into the workstack for re-allocation. This lost time is recorded in the engineer utilisation statistics.

3.18 The model assumes that the skill categories operate in a strict hierarchy in the order outlined above. For example, a BBUG or a UG engineer may be used as a substitute engineer for visits requiring a CAL engineer, but an OMI engineer cannot be used as a substitute engineer for visits requiring a CAL engineer.

[163] Where both upskilling and attrition/new recruits have been set to occur in the same week, the upskilling will be applied after the net change due to attrition or new recruits has been applied

Step 5 - Activity: job execution

3.19 The calculation of a job's target completion time depends on the Care Level and, where applicable, the customer agreed appointment slot:

- **Non-appointed Care Level 1 jobs:** end of next working day + 1 day (Saturday and Sunday excluded);
- **Non-appointed Care Level 2 jobs:** end of next working day (Sunday excluded);
- **Non-appointed Care Level 3 jobs:** where the job is logged before midday, end of day. Where the job is logged after midday, the next day before midday;
- **Non-appointed Care Level 4 jobs:** 6 hours from the logged time of the job;
- **Non-appointed Provision jobs:** end of next working day + 1 day (Sunday excluded); and
- **Appointed jobs:** for Provision jobs and Care Level 1 and 2 jobs, the end of the day of the agreed appointment date is used as the target completion time. For Care Level 3 and 4 jobs, the end of the agreed appointment slot is used as the target completion time. As an exception, where the calculated target completion time based on the customer agreed appointment slot falls within the SLA specified by the Care Level, the end of the SLA period is used as the target completion time.

3.20 A job in the workstack can be defined as being in one of three categories, based on its target completion time:

- **Future:** the target completion time has not yet passed and occurs a number of days into the future;
- **Due:** the target completion time has not yet passed and is "today" with respect to the current time; and
- **Tail:** the target completion time has passed.

3.21 For each job, a first visit is created and added to the workstack. Non-appointed visits enter the workstack at the time at which they were logged. Appointed jobs enter the workstack at the beginning of the customer agreed appointment slot.

3.22 Once the visit has been allocated to an engineer, a frequency distribution is sampled to determine whether an additional engineer (an "assist") is required and, if so, whether the requirement is for a skilled or an unskilled assist. If a skilled assist is required, the skill required for the assisting engineer is sampled from the distribution and allocated appropriately. The initial visit and any subsequent assists are not forced to coincide. Instead, the model waits for all associated visits to complete before triggering either a further visit or completion of the job.

3.23 If a job is not complete and requires a further visit, then each further visit enters the workstack on completion of the previous visit and all associated assists. Appointments only apply to the first visit.

3.24 A job is considered to be complete when the final visit and all associated assists have been executed. At the point of completion, the job is recorded as either having passed or failed its SLA

target based on the current time and the target completion time. Service performance is calculated as the percentage of jobs which were completed within the SLA target.

Task and travel times

3.25 On being assigned a visit, the engineer is taken out of the pool of available resource for a defined period of time. This task time consists of the time taken to travel to the visit, and the actual time it takes to complete the visit.

3.26 Travel times are derived from a frequency distribution drawn from Openreach operational data and are sampled independently for each visit (including assists).

3.27 Task times are dependent on the type of activity (i.e., Repair or Provision), the product, the MFL, and the skill level of the engineer sent to complete the job. The task time is derived based on a frequency distribution of actual task times by week drawn from historical data.

3.28 Task times are sampled independently for each visit (including assists). If required, an adjustment can be made to underlying task times to account for "time-to-competency"[164] where less experienced engineers are deployed to complete a job.

Treatment of Tail jobs

3.29 Tail jobs are those that by definition have failed the relevant SLA. Under standard prioritisation rules, depending on levels of activity, these are likely to accumulate to form a backlog of failed jobs. Tail jobs can be cleared either from utilising spare capacity in the engineering pool or from engineers undertaking additional work outside of their standard working hours (i.e., overtime).

3.30 To simulate the management of Tail jobs, the Allocation Model has been specified to manage the number of jobs that form the Tail. The model sums the total number of Tail jobs at the end of each week and determines whether an engineer would have been allocated during the course of the previous week to complete each Tail job. This uses a probability distribution based on the number of days the job has been in the Tail.

3.31 Where the job has been identified as one that would have been completed, the job is recorded as a "failed completion", and is removed from the Tail. The engineer resource required to complete the outstanding visits for that job is estimated based on the minimum skill required to complete the job. This is then recorded as additional time (outside of the standard working hours) required to clear the Tail.

3.32 The amount of additional time required to clear the Tail should always be considered when comparing model scenarios as this is additional capacity over and above the base level of FTEs required to meet demand. Where capacity exists beyond work that is due on a given day, engineers will use this additional capacity to complete Tail work during the course of their normal working day (dependent on the job prioritisation rules in place).

3.33 Since performance is measured at the point of job completion, the strategy used to manage Tail jobs will have a direct impact on the weekly performance profile reported by the model.

The Glass Ceiling

3.34 Openreach faces an operational constraint such that there is a limit to the number of tasks that can be successfully completed for Provision and Repair activity on any given day. This is because there will always be a proportion of jobs that require additional network intervention such as civil engineering, additional equipment or where there are specific safety issues. This limit on performance is referred to as the "Glass Ceiling" and represents an operationally realistic upper limit to the proportion of jobs that can be completed within the target completion date.

[164] Time to competency refers to the increased task time from new recruits and engineers which have been recently up-skilled (e.g., from CAL to UG)

Openreach has separately provided analysis to Ofcom on the proportion of jobs that would fall above the Glass Ceiling.

3.35 This Glass Ceiling constraint has been reflected in the Allocation Model by the creation of five additional Care Levels, which have a target completion time of zero hours. These jobs automatically fail and are defined as Tail jobs. They enter the Tail in the week that the job was actually completed (rather than the week that the job was reported) to reflect the fact that many of the jobs which relate to the Glass Ceiling require civil engineering work or are complex jobs which cannot be completed for a number of weeks.

Step 6 – Outputs

3.36 The outputs of the Allocation Model are collated on a weekly basis at a GM or SOM area level. The outputs of the model includes:

- The volume of logged jobs, agreed appointments, passed completions and failed completions;
- Service performance (i.e., the proportion of jobs completed within the SLA) split by product, MFL, Care Level and appointment status;
- Workstack status at the close of each week detailing the number of jobs in the workstack against the number of days +/- their target completion time;
- Total available time by engineering skill level split by different categories of time (idle, busy, lunch and end-of-day inefficiency);
- Total busy time by engineering skill split by the time spent executing Future, Due and Tail jobs during standard working hours;
- Total time clearing Tail jobs outside of standard working hours;
- Projection of available time (supply) and committed time (demand) by Repair engineering skill; and
- The Stress factor.

Appendix A Jobs / products included in the Allocation Model

The table below details the mix of jobs and products which are included in the Allocation Model:

Provision/Repair	Product	MFL
Provision	**GEA-MSL (Fibre)** **GEA-NON (Fibre)** **MPF-MSL (Copper)** **MPF-NON (Copper)** **WLR-MSL (Copper)** **WLR-NON (Copper)** **SMPF (Copper)**	**CEASE** **PROV** **SIM** **TV**
Repair	**NGA-MSL (Fibre)** **NGA-NON (Fibre)** **WLR3-MSL (Copper)** **WLR3-NON (Copper)** **LLU-MSL (Copper)** **LLU-NON (Copper)** **SFI**	**CA, CE, DT, EX, FU, LN, OK, Other**
	BBB	**BBB**

Annex 3 – Deloitte's review of Ofcom's Analysys Mason model and the Openreach allocation model

This report will follow as soon as it is available.

Comments on Legal Instruments

411. We have reviewed the draft legal instrument and have identified some errors, typos and omissions as detailed below. These comments should be read alongside observations and the draft legal instruments as marked in the main body of this response.

- Para. 5 last sentence (page 221) should say "… by 9 June 2017".
- Para. 12 (page 222) includes an erroneous "act".
- Para. 10 (page 229) – "the" should be deleted from the following sentence: "instances of failure occurring within the up to two Relevant Regions …"
- Para. 3 (page 233) refers to Annex 23 of the QoS Consultation – it should refer to Annex 8 of the QoS Consultation or Annex 23 of the WLA Consultation.
- Para. 4 (page 234) should say "… including **a** requirement …"
- Para. 12 (page 235) should refer to "paragraph 8" not "paragraphs 8"
- Para. 23 (page 237) – item (l) "High Level MBORC Declaration" should be moved to after item (h) "Fault and before item (i) "Hull Area".
- The definition of "Scheduled Outages" at item (y), para. 23 (page 239) and item (g), para. 24 (page 256) can be removed as Ofcom is proposing to remove the Gateway Availability KPIs to which the definition relates.
- Para. 3 (page 242) – BT should not be required to publish BTC volume information as required by the publication of numerators and denominators - we are concerned that publishing BT's own volumes would disclose commercially sensitive information which would give BT's competitors an unfair insight into BT's commercial activities and would require BT to share confidential strategic information with competitors which would reduce uncertainty on the downstream market and could restrict competition.
- Top of page 246 – KPI (v) – "the" should be "The"
- KPI (xi)(b) (page 247) should refer to "affected by Local MBORC Declarations" not "High Level MBORC Declarations"
- Schedule 2 (page 249) refers to "Incomplete Repairs and Installations" although the defined term is "Incomplete Installations and Repairs"
- KPI (xiii) (page 248) should refer to "30 calendar days" not "28 calendar days" to align with the current KPI and the way in which Openreach measures repeat faults for WLR.
- Annex 2 (from page 250) refers to Shared Access but this does not appear to be defined.
- Para. 2 (page 250) – footnote 235 is in the wrong place.
- Para. 4 (page 250) refers to Annex 23 of the QoS Consultation – it should refer to Annex 8 of

the QoS Consultation or Annex 23 of the WLA Consultation.

- Para. 5 (page 251) should say "… including **a** requirement …"
- Para. 11 (page 252) should refer to "paragraphs 12 to 21 below" not "paragraphs 11 to 20 below".
- Para. 13 (page 252) should refer to "paragraphs 16 or 17 below" not "paragraphs 15 or 16 below".
- Para. 14 (page 252) – it appears that the reference to paragraph 15 should refer to paragraphs 16 and 17.
- Para. 16 (page 252) should refer to "paragraphs 12 to 14 above" not "paragraphs 11 to 13 below".
- Para. 18 (page 252) should refer to "paragraph 15 above" not "paragraph 14 above".
- Para. 21 (page 253) should refer to "paragraphs 12 to 15" not "paragraphs 11 to 14"; the reference to "Schedule" should say "Schedule 1" and there also doesn't appear to be an equivalent paragraph in the WLR Direction.
- Para. 24 (page 253) – the definition of Appointed Orders currently excludes appointments at the cabinet for GEA-FTTC although we understand that Quality of Service Standard 1 for GEA-FTTC will apply to all appointments, both at the cabinet and the end customer premises – we suggest this definition is amended accordingly.
- Para. 24 (page 255) – the numbering is incorrect and restarts again from (a) after (x).
- Our proposed changed to the regional structure should be reflected in the definition of Relevant Regions on page 224, 238 and 255.
- Para. 1(b) (page 259) – at paras. 7.25 and 7.26 of the consultation, Ofcom acknowledges that Service Maintenance Level 1 is not currently offered on GEA-FTTC and states that it would consult on changes to the KPIs if it is offered in the future. We do not consider it necessary or proportionate to impose a KPI for GEA-FTTC at SML1 where there is currently no CP demand and where Ofcom will need to consult on amending the KPIs in any event. As a result, we suggest this paragraph is amended to reflect the wording in para. 1(c) for FTTP.
- Para. 4 (page 260) - BT should not be required to publish BTC volume information as required by the publication of numerators and denominators - we are concerned that publishing BT's own volumes would disclose commercially sensitive information which would give BT's competitors an unfair insight into BT's commercial activities and would require BT to share confidential strategic information with competitors which would reduce uncertainty on the downstream market and could restrict competition.
- Para. 5(b) (page 260) – at paras. 7.25 and 7.26 of the consultation, Ofcom acknowledges that Service Maintenance Level 1 is not currently offered on GEA-FTTC and states that it would consult on changes to the KPIs if it is offered in the future. We do not consider it necessary or proportionate to impose a KPI for GEA-FTTC at SML1 where there is currently no CP demand and where Ofcom will need to consult on amending the KPIs in any event. As a result, we would suggest removing the following text from para. 5(b): "(where, in the case of

KPI (iii)(a), there are 100,000 or more such active connections in a Relevant Region)".

- KPI (xii) (page 265) refers to "Service Level Commitment" but this term is not defined.
- Schedule 2 (page 267) refers to "Incomplete Repairs and Installations" although the defined term is "Incomplete Installations and Repairs". The numbering also starts at (h).
- Page 272 – it appears the title "Decision" should refer to "Direction"
- Page 275 – it appears the title "Decision" should refer to "Direction"
- Para. 9 (page 276) – sentence needs a full-stop.
- Para. 11 (page 276) – "BT" is a defined term although it is not defined in any of the other annexes.
- Part IV (page 279) – formatting of footnote 352 within the text should be addressed.
- Glossary (from page 290) – Ofcom may wish to define the following terms which are referred to within other definitions: "Distribution Point", "Local Access Networks", "GPON".