OFCOM'S PROPOSED REMEDIES FOR 2021 TO 2026

A Report for Vodafone

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EXECUTIVE SUMMARY

Context

The UK fixed broadband market continues to develop, with customers migrating to higher speed services – 95% of UK consumers can now access superfast broadband capable of achieving a bandwidth of 30 Mbit/s or higher.[1]

Customers will require higher bandwidths in the future than can be provided over legacy copper networks, and the UK lags well behind other developed nations in the roll-out and penetration of full fibre networks which can meet this demand.[2] The Government has therefore set a target of full-fibre deployment across the UK by 2033.[3] However, rolling out such networks is labour and capital intensive which raises challenges in both operational deployment and financing.

Ofcom has acknowledged that there are important differences between the mass market for broadband and the market for business connectivity, recognising in particular that full fibre is already available for the provision of dedicated leased line services for business customers.[4]

Ofcom's proposals

Ofcom is now proposing a significant change from its previous approach for both mass market (Wholesale Local Access or "WLA") and business connectivity markets, with the main objective to incentivise investment in "full-fibre" networks to meet the Government's targets.

In particular, Ofcom is proposing to reduce the scope of wholesale regulation and to allow the remaining regulated prices to be set above cost. This proposed shift is intended to improve the business case for fibre roll-out by increasing the prices paid by customers.

In implementing this new approach, Ofcom is proposing to vary its regulation depending on the expected level of competition in a geographic area, based on the expected number of competing networks. This involves:

- using a common framework for market analysis for both mass market and business services, in the expectation of future convergence in the networks, and hence, competitive conditions for these different customers segments;
- limiting regulation to the legacy regulated active and passive services in 'prospectively competitive' areas, and implementing a 'price freeze' instead of the requirement for prices to fall in line with unit costs for these services; and

1 Ofcom (2019). Connected Nations Update

2 Ofcom (2018). The Communications Market Report

3 Full fibre target set out by Chancellor 22 May https://www.gov.uk/government/speeches/chancellor-speech-cbi-annualdinner-2018 .

4 https://www.ofcom.org.uk/__data/assets/pdf_file/0015/72303/bcmr-final-statement-volume-one.pdf

- introducing utility style 'RAB' regulation for areas where there is no expectation of entry of new fibre networks to compete with Openreach, allowing Openreach to pass through the cost of FTTH rollout in higher wholesale prices.

Need for an impact assessment

Ofcom has an obligation under section 7 of the Communications Act 2003 to undertake impact assessments where its decisions would likely have a significant effect.[5] Given that Ofcom's proposals represent a significant change in regulatory trajectory and are intended to have a material effect, it appears necessary for Ofcom to carry out an impact assessment for its proposals.

An impact assessment is particularly important given that there are clear costs to consumers from Ofcom's proposals – retail prices would be expected to increase in both prospectively competitive and non-competitive areas during the period covered.

The benefits Ofcom expects from these proposals are that there would be an increase in investment, and therefore more fibre roll-out compared to a counterfactual where regulation evolves as per the current trends. However, it is not obvious that there will be a material increase in investment, nor that overall the benefits to consumers of any increased investment will offset the costs to consumers.

Ofcom must therefore carry out an impact assessment which clearly sets out and compares the expected costs and benefits of the new approach. In particular, Ofcom should consider:

- the costs to different groups of consumers from any intended or unintended consequences of this approach, including the expected higher retail prices and any reduction in access-based competition.
- the quantum of increased investment that could be expected from the new regulatory approach; and
- the benefits from the expected additional investment and the customers to whom these benefits are likely to accrue.

At a minimum, these costs and benefits should be considered against a counterfactual where regulation continues with Openreach services priced at Openreach costs.

Expected consumer costs from Ofcom's proposals

The investment incentive mechanisms implicit in Ofcom's proposals require an increase in retail prices to deliver increased investment by increasing expected revenues:

- In prospectively competitive areas, this will be through an increase in the regulated price of lower bandwidth services and hence retail prices for these

[5] Ofcom (2005). "Better Policy Making – Ofcom's approach to Impact Assessments"

services, which would also be “passed through” to higher bandwidth services to a lesser degree.

- In non-competitive areas, this will be because regulated prices would be set for these regions to recover the higher cost of FTTH roll out (as these tend to be less densely populated areas).

This means that the expected costs to consumers from the proposals (increased prices) are relatively certain and will be spread over a wide group of customers.

Furthermore, between and within the defined geographic markets, the burden of price increases will not be equally shared between consumers, raising important questions for Ofcom about fairness:

- In non-competitive areas where no fibre network is available, mass market customers will be reliant on Openreach’s copper-based products (and mobile services). However, the prices of these products will rise above cost to cross-subsidise those customers who benefit from fibre roll out. Thus, they will be paying higher prices for no direct benefit; and
- In competitive areas the cost will be borne by all customers but with the greatest effect on broadband prices likely to be for those customers who take lower bandwidth services. It is likely that vulnerable customers will be disproportionately concentrated within this group of customers.

For business connectivity services, Ofcom’s proposals will result in higher prices compared to the counterfactual because the natural evolution of speed and prices that exists under the current regime will be replaced with a price freeze.[6]

The slow-down in the rate of higher speed introduction (and subsequent price reductions) will reduce the rate of innovation and productivity in sectors dependent on business connectivity services, including the mobile market (where fibre networks are increasingly used to provide backhaul), and for IT intensive corporate users.

Impact of proposals on the quantum of investment

As a result of setting regulated prices above costs, Ofcom expects there to be more network investment. However, many of the benefits of higher speed networks will be delivered by investment which is unlikely to be materially affected by price regulation. This is because these investments are driven by the competitive dynamics and would therefore take place anyway. Such investments include the upgrade to DOCSIS 3.1 to provide Gigabit services by Virgin Media and fibre roll out by Openreach in areas where it faces competition from networks offering Gigabit speeds.

Where investment decisions are impacted to a certain extent by price regulation, the degree to which the change in regulation leads to higher investment will depend on two factors:

[6] Ofcom’s current regulatory approach has led to a product lifecycle where higher speed services have been introduced at a significant price premium to the current mainstream service, but over time the cost converges to broadly the same level as they are brought into cost-based regulation.

- The extent to which the higher Openreach regulated wholesale prices increase the expected revenues from new investment and hence increase returns to investors; and
- The degree to which any increase in returns means that marginal investments will become viable.

However, as will be seen below, the proposals are unlikely to increase expected revenues sufficiently to incentivise significantly more investment than would take place in the counterfactual.

Roll-out in areas where there is no current, or prospect of, competition

Ofcom's suggested approach in non-competitive areas is to move to utility-style regulation. While utility-style regulation can provide strong incentives for investment, an effective and practical implementation of such an approach to Openreach would be complex. If the lack of investment in these areas is due to a lack of sufficient (consumer) willingness to pay for higher speed services to cover the cost of roll-out in these high cost areas, utility-style regulation will not address this as it does not materially alter the costs of roll-out or the willingness to pay of the subscribers. Thus, it is unclear if the proposed regulation could result in complete roll-out in these areas, even in theory.

Roll-out by another operator in areas where only Openreach is present

Ofcom's approach could increase returns on 'second network' roll-out (i.e. roll-out of the first competitor to Openreach in a given area) to the extent that increases in regulated WLA wholesale prices for lower bandwidth products have some 'pass through' into expected ARPUs for fibre customers. This could increase the revenues for a potential new entrant and hence improve the business case.

However, the pass-through effect from the lower bandwidth wholesale products to the revenues from the sale of higher bandwidth products will be modest. This is because these products are not perfect substitutes for each other and so increases in the price of one service will not feed directly through to the pricing of another.

For business connectivity services, a range of barriers to switching providers of these high-quality services, even where competing fibre networks are close by, will limit the pass-through of higher Openreach regulated prices into entrants' expected revenues from these customers.

In addition, the scope for further second-party roll out post-2021 will be limited as around 60% of households will be covered by a network other than Openreach (largely Virgin Media). This leaves only around 10% of households (and presumably a lower proportion of business customers) in areas which are prospectively competitive but not yet covered by a second operator.

A combination of the limited increase in entrant revenues and the limited scope for further roll-out means the impact of Ofcom's proposals on second-network coverage will be limited.

Roll-out of a third network

The impact on incentives to roll out third (or fourth) networks is likely to be smaller still. In addition to the fact that regulated wholesale prices will only be an indirect constraint on revenues for a new entrant, Ofcom has clearly signalled that in subsequent market reviews, areas with at least three infrastructure operators will be deregulated. As such the impact of regulation on a third entrant will be at most for the first five years after investment. This will have limited impact on the business case and overall returns from investment given that fibre networks have lives measured in decades. In the short initial period where the geographic area is subject to regulation, the number of subscribers for an entrant third operator would also be relatively low as market share increases gradually, further limiting the impact of regulation on overall returns over the lifetime of the assets.

In conclusion, it is not obvious that Ofcom's proposals would lead to a material increase in coverage of third operators, compared to a counterfactual where regulated prices are set at cost in the period prior to deregulation.

Expected consumer benefits from Ofcom's proposals

It also unclear if Ofcom's proposals will lead to significant consumer benefits.

If the proposals were to meet their intended objectives, further investment in fibre networks would have two impacts:

- Some customers who currently do not have access to ultrafast broadband ("UFBB") networks would gain access to UFBB – this would lead to an improvement in economic welfare, access to higher quality services (compared to copper) and productivity benefits; and
- There would be an increase in the number of UFBB competitors, presumably largely in the prospectively competitive areas – this would lead to prices being set by the market and more innovation.

The benefits from the former are expected to be much larger than those from the latter; indeed, the policy decision to roll out full-fibre networks assumes that overall the welfare detriments from not having access to UFBB are significant.[7]

As current business connectivity customers are already served by fibre, any benefits of the first type will be restricted to mass market customers. Furthermore, as discussed, it is not clear that the new proposals will lead to a significant increase in roll-out compared to the counterfactual.

The benefits to consumers would also thus be expected to be limited to the small proportion of customers who either gain access to UFBB or enjoy more competition.

[7] https://www.ofcom.org.uk/research-and-data/telecoms-research/broadband-research/economic-impact-broadband

Conclusion on the need for an impact assessment

Ofcom's proposals have the intent, and will have the effect, of increasing retail prices. This will cause widespread harm to consumers, with the harm not falling equally on all customers. In particular:

- in non-competitive areas there could be significant price increases which will largely fall on customers who will not benefit from fibre roll-out (at least in the medium term); and
- in prospectively competitive areas the cost may disproportionately fall on vulnerable customers, who again do not directly benefit from fibre roll-out.

Ofcom's proposal suggests that this detriment will be compensated for by the economic welfare consumers would enjoy in the longer term from having access to higher quality ultrafast broadband services. However, Ofcom has not quantified the scale of this increased investment and hence economic welfare. In fact, it appears that the increase in investment (and subsequent welfare) will only benefit a small subset of customers whilst the costs, as seen above, would be widespread.

Therefore, before implementing these proposals, it is essential that Ofcom carry out a detailed impact assessment, including a comparison between:

- the expected market and investment outcomes under its proposal; and
- the outcomes expected under a counterfactual where regulation evolves in line with the approach to date.

1 INTRODUCTION

1.1 Background

To meet Government targets for full-fibre deployment across the UK by 2033, [8] several policy and regulatory initiatives have been put in place to reduce the costs of rolling out networks and hence increase the returns from investment. For instance, Ofcom have mandated that BT allow competing companies to use Openreach's ducts and poles to build networks for both residential and small-business connections; it has also extended access to firms serving large businesses, as well as companies laying high-speed lines that support mobile and broadband networks. [9] These supply-side measures to reduce costs do not negatively impact consumers.

Against this background, Ofcom outlined its broad approach to regulating downstream fixed markets to support fibre investment in its July 2018 "Strategic Policy Position". Ofcom is proposing a significant change from its previous approach for both mass market (WLA) and business connectivity markets, with its objective being to incentivise investment in "full-fibre" networks by influencing the demand side, in particular by allowing prices to rise in the short term in order to bring benefits in the longer term.

Ofcom is proposing varying its approach to regulation depending on the expected level of competition in a geographic area. This involves:

- using a common framework for market analysis for both mass market and business services in the expectation of future convergence in the networks serving these customers;
- limiting regulation to the currently regulated active and passive services in 'prospectively competitive' areas and removing the cost orientation requirement on these services, implementing a price freeze instead; and
- introducing utility style 'RAB' regulation for areas where there is no expectation of entry to compete with Openreach.[10]

1.2 Need for an impact assessment

Ofcom has an obligation under section 7 of the Communications Act 2003 to undertake impact assessments where it is proposing to do anything for the purposes of, or in connection with, the carrying out of its functions, and it appears that the proposal is important.[11] [12]

[8] Full fibre target set out by Chancellor 22 May https://www.gov.uk/government/speeches/chancellor-speech-cbi-annualdinner-2018 .

[9] https://www.ofcom.org.uk/__data/assets/pdf_file/0027/154593/volume-1-pimr-final-statement.pdf

[10] The policy context and Ofcom's proposals are discussed in further detail in Annex B.

[11] Communications Act 2003, Section 7

[12] The only exception to this is if the urgency of the matter makes it impracticable or inappropriate for Ofcom to comply with this requirement.

The act defines a proposal as "important" if its implementation leads to:

- a major change in the activities carried on by Ofcom;
- a significant impact on persons carrying on businesses in the markets in relation to which Ofcom have functions; or
- significant impact on the general public in the United Kingdom or in a part of the United Kingdom.[13]

Accordingly, Ofcom has often conducted impact assessments as part of the consultation process. For example, Ofcom's consultation document constituted its impact assessment in the two most recent Wholesale Local Access ("WLA") Market Reviews.[14] In its most recent WLA Market Review Ofcom explain its approach to Impact Assessment as:

> *"… generally, we have to carry out impact assessments in cases where our conclusions would be likely to have a significant effect on businesses or the general public, or where there is a major change in Ofcom's activities. However, as a matter of policy Ofcom is committed to carrying out impact assessments in relation to the great majority of our policy."*[15]

Generally, when providing reasoning for their decision, Ofcom first set out their objectives for the proposed regulation (for instance, in the WLA consultations, these related to balancing investment incentives and consumer protection) and then provide an assessment of how the proposed remedy satisfies each of these objectives, while considering the views of stakeholders.

Given that Ofcom's proposals represent a significant change in regulatory trajectory and are expected to have a significant effect, it is necessary for Ofcom to carry out an impact assessment for its proposals.

1.3 Structure of this report

In this report, we set out the factors that should be considered by Ofcom when carrying out its impact assessment against a counterfactual where regulation continues as it has, with Openreach services priced at Openreach costs:

- Section 2 discusses the costs to consumers from any intended or unintended consequences of this approach;
- Section 3 considers the quantum of increased investment that could be expected from the new regulatory approach;
- Section 4 outlines the benefits to consumers from the expected additional investment; and
- Section 5 presents our conclusions.

[13] Communications Act 2003, Section 7

[14] Ofcom (2014). Fixed access market reviews: wholesale local access, wholesale fixed analogue exchange lines, ISDN2 and ISDN30 Volume 1; and

Ofcom (2018). Wholesale Local Access Market Review: Statement – Volume 1

[15] Ofcom (2018). Wholesale Local Access Market Review: Statement – Volume 1

2 EXPECTED COSTS OF OFCOM'S PROPOSALS

First, Ofcom must consider the costs imposed by its proposed remedies on consumers, especially in the context of its objectives. In this section, we first set out Ofcom's objectives, and then discuss the expected costs of Ofcom's proposals for:

- broadband customers in prospectively competitive areas;
- broadband customers in non-competitive areas; and
- customers of high-quality services.

2.1 Ofcom's objectives

Ofcom's overall objective is to secure the best outcome for end-users. This can include:

- Ensuring availability of services;
- Encouraging competition to increase the benefits of services through greater innovation and greater efficiency;
- Reducing the overall prices paid for services; and
- Ensuring that prices paid by all groups of users reflect a fair distribution of costs.

In previous wholesale charge controls, Ofcom has focussed on the overall level of prices paid by consumers and less on distributional effects in downstream markets. However, Ofcom has now made fairness one of its key objectives.

The over-riding objective of Ofcom's proposals is to increase the availability of fibre networks. However, not all mass market customers will have timely availability of fibre networks and not all users will see personal need for very high bandwidth services. As such there will be distributional effects related to benefits, and it is reasonable to ensure that these are considered when assessing the impact of Ofcom's proposals.

It will be important to understand, in particular, whether the distribution of costs reflects the distribution of benefits. For example, when determining appropriate cost recovery, Ofcom has set out 'the six principles of pricing and cost recovery' which includes the principle:

> *Distribution of benefits: costs should be recovered from the beneficiaries especially where there are externalities.*

While it could be argued that broader externalities mean that all UK residents benefit from greater fibre roll out, the benefits will be enjoyed disproportionately by those customers that actually gain access to fibre services but who would not absent Ofcom's intervention.

2.2 Impact in prospectively competitive areas

In terms of costs for broadband customers, the main impact in prospectively competitive areas will be to increase retail prices.

This will be through an increase in the regulated price of lower bandwidth services and hence retail prices for these services, which would also be "passed through" to higher bandwidth services to a lesser degree.[16] The greatest price increases will therefore likely be felt most by those customers who do not benefit from the increased roll out of fibre networks either because:

- the higher speed services are not available in their location, for example where gigabit networks have not rolled out; and.
- they do not have sufficient willingness to pay for the higher speed (and higher price) services.

To the degree that a higher proportion of these customers may be considered "vulnerable" this may conflict with Ofcom's fairness objective. Their outcomes may in fact be made *worse* by Ofcom's proposals as the removal of copper price regulation would likely increase the price of their copper-based broadband. This could then also lead some customers to leave the network due to affordability issues.

Furthermore, as discussed in Section 3.2.2, the proposed remedy may not affect investment decision-making to a sufficient degree to encourage third-player entry and hence deregulation. In such a scenario, regulation will have been relaxed and prices would have consequently gone up. However, without additional entry, prices will remain at this level, imposing a welfare loss on consumers with no corresponding benefit.

2.3 Impact in non-competitive areas

Ofcom's proposals in non-competitive areas implicitly assume cross-subsidy wherein customers who do not directly benefit from increased fibre investment pay for this investment through higher prices. Given the lack of clarity on the market failure that this approach is aiming to address (see Section 3), it is not clear that customers who do not benefit from increased fibre roll-out in the short-run would even benefit in the long term.

For example, if the aggregate willingness to pay for higher speeds is not sufficient to cover the aggregate cost of roll-out, then cross-subsidisation cannot in itself ensure universal coverage – the funds needed for investment will simply not be generated. In this case, Ofcom's approach would lead to a clear detriment to the group of customers who pay increased prices but will not be covered by fibre roll out.

[16] The subsequent "pass through" of the higher retail price from low bandwidth products to high bandwidth products (which cannot be delivered form Openreach's current copper network) will be less than 100% because they are not perfect substitutes for each other.

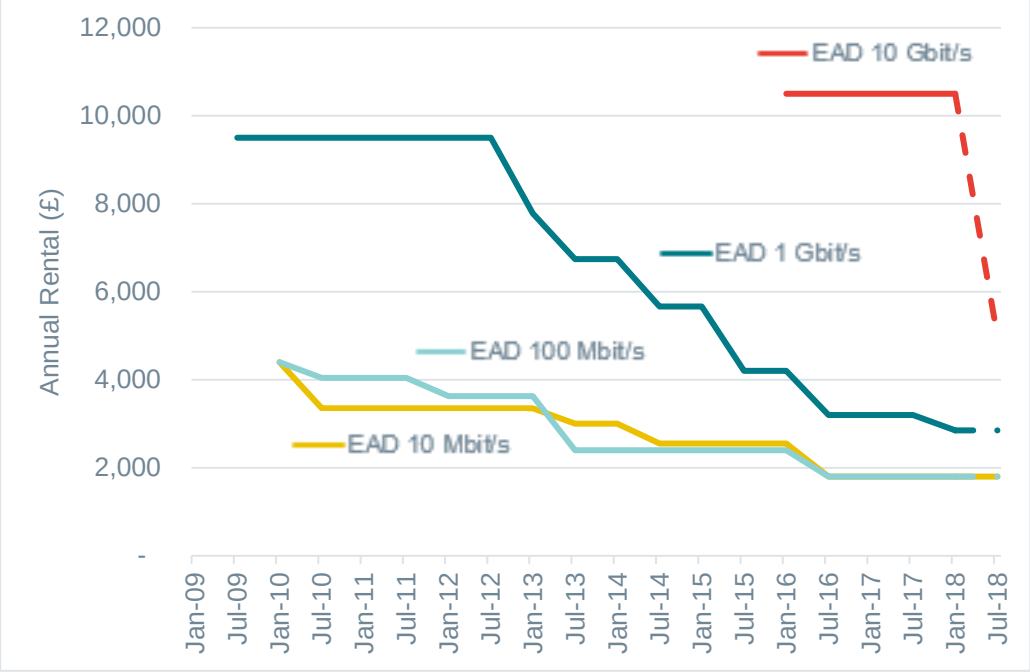
Conversely if there are a significant number of customers who have sufficient willingness to pay for fibre roll-out, it is unclear why cross-subsidy is needed. In this case the cross-subsidy implicit in the RAB approach would seem to result in a simple transfer between customers.

Finally, for areas where fibre is rolled-out, the removal of price regulation on copper after two years of fibre roll-out would likely leave vulnerable customers who cannot afford higher speed services worse-off.

2.4 Impact on users of high-quality services

Under the current regulatory approach (i.e. in the counterfactual relative to Ofcom's proposals), Ethernet technologies have evolved over time, with each successive technology offering an order of magnitude (factor of 10) increase in speed over the previous technology. This has led to a product lifecycle where higher speed services have been introduced at a significant price premium to the current mainstream service, but over time the cost converges to broadly the same level as they are brought into cost-based regulation. This pattern in Openreach's pricing over time is illustrated in the figure below.

Figure 1 Openreach prices (annual rental) for Ethernet Access Direct services over time



Source: Frontier Economics based on Openreach's EAD price list.

At the same time, Openreach's average prices have also fallen overall due to charge controls reflecting reductions in the cost of provision.

For these services, Ofcom's proposals will result in higher prices compared to the counterfactual because this natural evolution of speed and prices will be replaced

with a price freeze. The impact will be particularly large for higher speed services, where prices are currently significantly above costs, as these will no longer be brought into the scope of regulation over time.

The slow-down in the rate of higher speed introduction (and subsequent price reductions) means that the rate of innovation and productivity in sectors dependent on high quality services will fall. The reduction in innovation will also affect customers in the mobile market (i.e. mobile network operators), where fibre networks are increasingly used to provide backhaul.

Thus, the impact on end-consumers due to higher prices for high quality services will be indirect and potentially greater. This is because the costs of reduced innovation among customers of high-quality services (such as mobile network operators and corporate users) will be passed on to end-consumers in the form of higher prices and lower quality.

2.5 Conclusion on expected costs

As discussed above, Ofcom's proposals are likely to result in costs to consumers spread over a wider group of customers – as seen above, customers in prospectively competitive and non-competitive areas, as well as users of high-quality services are all affected. This is because the investment incentive mechanisms in the proposals require an increase in prices to incentivise increased investment.

Furthermore, within geographic areas, the burden of price increases for broadband customers will not be equally shared between consumers, raising important questions for Ofcom about fairness:

- In non-competitive areas where no fibre network is available, mass market customers will be reliant on Openreach's copper-based products. However, the prices of these products will have risen above cost so as to cross subsidise those customers who benefit from fibre roll-out. Thus, they will be paying higher prices for no benefit; and
- In competitive areas, the cost will be borne by all customers but with the greatest effect likely to be for those customers who take lower bandwidth services. It is likely that vulnerable customers will be disproportionately concentrated in this group of customer.

3 IMPACT ON QUANTUM OF INVESTMENT

As set out in Section 1, in carrying out an impact assessment, Ofcom should estimate the quantum of increased investment that could be expected from the new regulatory approach. In this section, we:

- first set out the market players current incentives to invest; and
- then discuss the impact of Ofcom's proposals on these incentives.

3.1 Current investment incentives of market players

The expected demand[17] for higher speed services will underly the investment case for operators, irrespective of regulation.

In a study conducted for Ofcom, WIK forecast that by 2025, when faced with no technological or pricing constraints, around 40% of UK households may demand at least 1Gbit/s downstream and 600Mbit/s upstream by 2025, with more than 40% demanding at least 300Mbit/s symmetric.[18] These services can only be delivered using full fibre or HFC (cable) networks. In this scenario, only 10% of consumers who are willing/able to connect to broadband would demand less than a 300 Mbit/s connection, which could be provided using Openreach's copper infrastructure.

Even in the most conservative scenario modelled by WIK,[19] the majority (57%) of households demand a bandwidth connection above 300 M/bits which would require either full fibre or cable network access.

Consequently, several existing and new operators have announced plans to roll out high speed networks in the coming years. Figure 2 outlines current plans and future aspirations of:

- major providers who have announced plans for a network of over 1.5m homes; as well as
- smaller players such as Gigaclear and KCOM – Gigaclear mainly targets rural areas and KCOM has already completed their full-fibre roll out in Hull and East Riding.

[17] This will be likely driven by factors such as: quality and usage of video services, cloud traffic, the 'tactile internet' such as remote diagnostics and autonomous driving, and immersive media such as virtual reality.

[18] WIK (2018). Benefits of ultrafast network deployment.

[19] This scenario continues to assume lower bandwidth requirements and no use of 8K TV or VR (except for gaming).

Figure 2 Current and future roll-out, by operator

Operator	Current network coverage	Future coverage
Openreach	27.5m connected with FTTC and 1.2m connected with FTTH	15m homes connected with FTTH by the mid-2020's.
Virgin	15.2m homes connected to an HFC cable network.	Project lighting announced in 2015, with the aim of growing the HFC network to 17m homes.
CityFibre	Currently rolling FTTH out to 1m homes.	5m homes connected with FTTH by 2025.
Hyperoptic	400,000 homes connected with FTTH.	2m homes connected with FTTH by 2022, with 5 million by 2025.
Gigaclear	65,000 homes connected with FTTH.	500,000 connected with FTTH by the end of 2022 (mostly in rural areas).
KCOM	200,000 homes connected with FTTH.	N/A – roll out completed across network.

Source: Operator websites

There are also a significant number of operators who have announced plans for smaller networks targeting specific regions or niches.[20]

In this sub-section, we set out the likely incentives to invest in UFBB:

- Virgin Media in its existing footprint;
- Openreach; and
- Operators, including new entrants, seeking to expand their footprint.

3.1.1 Virgin Media roll out of DOCSIS 3.1

The HFC cable networks, rolled out by UK cable franchises in the 1990s and later consolidated into Virgin Media, were largely built to offer two-way services and later upgraded to offer broadband services using DOCSIS technology.

Successful generations of DOCSIS technology have offered higher bandwidths with some limited investment in the access networks.[21]

The cost of upgrading the network for each generation is relatively low and the limited engineering work required means that there are no material operational constraints on rolling out new technology.

This means that roll-out of each new generation occurs rapidly as it becomes available. This is particularly the case because Virgin Media, along with other EU

[20] These include: CommunityFibre, Truspeed Communications, WightFibre, Open Fibre Network, B4RN, WarwickNet, Trooli, County Broadband, G.Networks, toob, and Zzoom (based on https://www.ispreview.co.uk/index.php/2018/04/building-uk-summary-fttp-broadband-rollouts-investment.html)

[21] For example, upgrading head-end equipment or segmenting the network to reduce the number of customers served by a single optical node, which may require replacing some of the co-axial network with fibre

cable operators, compete with other broadband providers (typically incumbent telephony firms) across almost all of their footprints.

For instance, the last major upgrade from DOCSIS 2.0 to DOCSIS 3.0 occurred rapidly across EU countries and reached the majority of subscribers. There was little variation in timing despite differences in regulation and competition across these countries.

3.1.2 Openreach's incentive to invest

Openreach's incentive to invest in overbuilding its existing network will differ depending on whether or not it faces competition in the area.

Openreach's incentives for fibre roll-out where it faces competition

As an existing operator, Openreach's incentives to invest in new infrastructure is more complex than that of a potential new entrant:

- It has an existing set of tangible and intangible assets it can use, such as infrastructure and an existing customer base, which will tend to make the business case more favourable than for new entrants.
- Openreach has an existing business generating positive cash flows which will be impacted by the new investment, which may reduce the incentives to invest.[22]
- BT, as the parent group, has strategic imperatives separate from Openreach such as being a 'national champion' and continuing to deliver services on a national basis.

In the case where there are (or are expected to be) alternative operators offering superior services, cash flows from existing operations would be expected to reduce over time, limiting the dampening effect of this second factor. For example, based on the WIK study, Openreach could only compete to service 10% of subscribers by 2024 using its current network. Failure to invest could lead to "stranding" of the underlying re-usable assets as customers migrate to competing networks. As a result, there is likely to be strong incentive for Openreach to invest in gigabit capable networks in prospectively competitive areas in the long term.

Openreach roll-out where it does not face competition

In areas where Openreach does not, and is not expected to, face competition, it will only invest where the incremental margins from investing are greater than the incremental costs of investing.

Even where the expected returns are greater than the cost of capital, investment may be delayed. In particular, with no time pressure due to competition, the 'real option' to delay investment may have value which would be foregone if Openreach invests. This option value may be due to the value of future information which could

[22] These cash-flows may be influenced by Ofcom's approach to regulating the copper network under both the counterfactual case where Openreach does not invest and the case where it does invest, complicating the impact assessment.

affect returns such as the willingness to pay for new services or the Government's approach to subsidisation of rural roll-out. By delaying investment, there would be greater certainty on returns creating the option value.

In addition, operational constraints may encourage Openreach to focus on roll-out in areas where the potential cost of delay may be greater, for example where Openreach faces market share loss to competition from existing or entrant operators.

3.1.3 Operators expanding their footprint

Where an operator does not have an existing network the cost of roll-out and connecting customers in given areas can be determined with relative certainty. In this case the returns on potential investment are determined by the expected subscriber growth and the AMPU.

3.1.4 Conclusion

As seen above, there are relatively strong incentives for Virgin Media to invest in the counterfactual, as well as for Openreach to invest in prospectively competitive areas. The incentive for operators to expand their footprint will depend on the expected costs and revenues of the particular investment. Importantly, it is clear that Openreach may have limited incentive to invest in non-competitive areas.

We now turn to the impact of Ofcom's proposals on these incentives. To be an improvement over the counterfactual, one would expect the proposals to lead to an increase in investment by these operators over and above the expected investment under the current regulatory approach.

3.2 Impact of Ofcom's proposal

To assess the impact of Ofcom's proposals, it is necessary to identify the degree to which regulation affects current investment decisions:

- those where the incentive to invest is largely independent of regulatory intervention are likely to be unaffected by the proposals;
- those where incentives are heavily dependent on regulation will likely be more affected.

For the remedies to have the desired effect of increasing investment, the majority of investment decisions in the market should fall into the latter category.

However, as will be seen below, the majority of investments already planned in are independent of regulation and so, unaffected by the proposals.

3.2.1 Investment decisions largely independent of regulation – Virgin Media roll-out, Openreach roll-out in prospectively competitive areas and high-quality services

Investment in prospectively competitive areas

A number of investment decisions are likely to be largely independent of regulatory decision and therefore, will see no increase in investment as a result of Ofcom's proposals.

- Virgin Media is likely to introduce DOCSIS 3.1 technology in areas of current cable coverage irrespective of the approach Ofcom takes to regulation.
- Although Openreach has made public statements linking fibre investment to appropriate regulation, in areas where Openreach faces competition from networks that can offer Gigabit services it will face the option to invest or risk potentially stranding its assets.[23]

Investment in high quality services

Furthermore, the effect of regulation on investment for further roll out of networks for high quality services may also be limited. Margins on these services are historically relatively high, leading to some degree of infrastructure-based competition in areas where demand is concentrated, such as Central London. However, even in these areas other barriers to entry reduce the degree of competition for customers.

3.2.2 Investment decisions where impact of regulation is limited – operator expansion and third player roll-out

Regulation could have some influence over operator expansion and third-player roll-out. However, as discussed below, the impact of these proposals on such decisions is also limited.

While Ofcom cannot fetter its discretion, it has clearly signalled that areas with three infrastructure-based operators are likely to be de-regulated in future market reviews. This means that investment that is expected to result in areas becoming three player markets (or in areas which are already three player markets) will be expected to lead to deregulation from the beginning of the next market review period. From that point regulation will not have a direct effect on cash flows.[24]

Thus, the main impact on new investment will be in the market review period where the investment is being made, i.e. for a maximum of five years after the investment is made. Regulation which affects the level of prices and hence AMPU, will have proportionately less impact on investment decisions as the number of customers

[23] Ofcom's proposal to remove price-regulation of copper-based services after two years in areas where Openreach has deployed fibre could increase Openreach's returns from fibre roll out. However, as these returns are likely to be sufficient due to the competitive pressure of other players rolling out fibre, the marginal impact of this de-regulation on the incentive to roll-out is therefore minimal.

[24] There may be indirect effects of regulation in other geographic areas, for example if retailers wish to set national level prices, the optimal level of prices in unregulated areas could be affected by the level of regulated wholesale prices in regulated areas.

will typically be lower immediately after investment than in later years (although this will be offset to a degree by the revenues in later years being discounted to a greater extent).

There is no clarity on the investment case for widespread third player roll out yet. The degree to which there may be marginal areas where a small change in returns will tip the balance is hence unknown.[25]

For some areas, the change in expected revenues in the first years of the investment may be sufficient to change the returns from marginally below the hurdle rate to marginally above the hurdle rate. The number of areas affected will depend on the cost curve around the point where roll out is marginal, i.e. the break-even point. If the cost curve is relatively steep at this point, only a small number of areas will become viable if discounted revenues per home are marginally greater. It is therefore possible that it is only a small proportion of areas where the business case is marginal, and hence, affected by Ofcom's proposals.

3.2.3 Investment decisions which may be materially influenced by regulation – second-player roll-out and Openreach roll-out in non-competitive areas

There are some investment decisions where regulation could have a material influence on incentives – these include:

- a second player, in addition to Openreach, rolling out a network; and
- Openreach rolling out fibre where there is none at the moment.

As will be seen below, the extent to which Ofcom's proposals will alter the current incentives is unclear.

Second player roll-out

Roll-out by a second player could be by Virgin Media extending their network or an entrant operator such as City Fibre rolling out a full fibre network in an area not currently covered by Virgin Media.

As these operators are not regulated, the route through which regulation will affect returns in the mass-market is indirect:

- As per the proposals, Openreach can set higher prices for wholesale services used to deliver lower bandwidth services;
- To the degree that there is switching between these services and higher bandwidth services (or a chain of substitution), Openreach can set higher prices for wholesale services used to set higher bandwidth products;
- This will increase the retail prices that can be charged by BT wholesale customers of Openreach.

[25] On the assumption differences in the demand side (e.g. AMPU and penetration) are relatively small compared to differences in the cost per home passed/connected.

The new entrant itself (if it is vertically integrated) or its retail customers can raise retail prices as well and/or gain market share.

This indirect nature of the link between changes in Openreach's wholesale prices and the AMPU and market share for potential entrants means that it is difficult to exactly determine the impact of the proposals on the entrants' margin. However, the "pass-through" effect will be greater the closer the level of competition between Openreach and the entrant for subscribers taking low bandwidth services. If there is little additional switching to the entrant if Openreach raises the regulated wholesale prices, for example because the entrant is targeting customers who buy much higher bandwidth services, then the level of pass-through will be limited.

Indeed, it is reasonable to assume that as most customers move to much higher speed services, the pass-through from wholesale services offering 40 Mbit/s downstream or less will be relatively limited.

However, there will clearly be some effect on the expected returns for new entrants, which will affect the point at which it remains profitable to roll out. Most modelling suggests that the cost to roll out begins to rise steeply at around 70% coverage. Given the combined coverage of Virgin Media and fibre providers will likely reach around 60% by 2020, 10% is an approximate upper bound on the likely impact and it is reasonable to assume that the impact will be much smaller. Thus, Ofcom's proposals are likely to have a limited impact on second-player roll-out.

In any case, if Openreach's pricing had a substantial effect on entry, then it would be possible for Openreach to disincentivise entry by lowering their prices (absent regulation) for higher bandwidth services that are more likely to have an impact on new entrant networks (as they would be hoping to target customers of high bandwidth services). If this were the case, then increasing the price ceiling for lower bandwidth services may have little impact on entrants.

Openreach fibre roll-out in non-competitive areas

To understand the potential impact of regulation on investment incentives in non-competitive areas, it is first necessary to understand the barriers to investment absent regulation. These will differ:

1. In some cases, no investment is made as the value of expected cash flows generated by connecting the customer to a fibre networks are lower than the cost of connecting the customer, i.e. connecting the customer is fundamentally unprofitable; and
2. In other cases, the customer has a willingness to pay for a fibre connection but Openreach is not incentivised to invest. There may be a few reasons for this:
   - Once Openreach takes account of cash flows from the existing business that would be foregone, returns are below their cost of capital;
   - Even where Openreach's expected returns are above the cost of capital the net present value of rolling out a network is less than the option value of deferring that investment; and

- Operational constraints and the availability of investments with higher returns means that investment in these areas are not made even if returns are above the cost of capital.

It is not clear which of the reasons for lack of roll-out in rural areas Ofcom's proposals are attempting to address.

In the first case, there is no commercial case for investment. In this case the only reason to encourage investment is that there is an assumption that the externalities so generated would be higher than the subsidy required.

If the underlying issue is the second, i.e. an overall shortfall in revenues due to a lack of willingness to pay, Ofcom's policy could allow for *some* customers in the non-competitive areas to benefit from fibre roll out but not *all*. Ofcom's approach effectively requires some customers to cross-subsidise others. While this can increase the incremental revenues and hence incremental cash flows from connecting some customers, it cannot increase the *overall* level of willingness to pay. An alternative approach would be to reduce Openreach's margins in the case where it chose not to invest, reflecting the fact that the prices for legacy services do not reflect the competitive level of prices.[26] This would increase the incremental returns from investment.

Similarly, Ofcom's proposal to remove price regulation on copper would have a minimal impact on the incentive to invest in non-competitive areas. This is because one of the drivers for the lack of investment is that consumers do not have the willingness to pay for a fibre product – increasing the price of copper products does not alter this lack of willingness to pay.

3.3 Conclusion on the impact on investment

In prospectively competitive areas, Ofcom's proposals to only control lower bandwidth services and to allow these services to increase above a cost-based level will marginally increase returns for roll-out of new entrants compared to a counterfactual where these services are regulated at cost. However, the fact that demand is likely to be concentrated in higher speed services will limit the effect. As a result, the benefits for areas served by two operators instead of one may be slightly greater. However, the impact on Ofcom's longer-term objective to have 3 or more operators is likely to be immaterial. Thus, the main impact may simply be higher returns for BT shareholders.

In non-competitive areas, the impact of Ofcom's proposals is not clear due to a lack of clarity on the objectives of the proposal – the proposals may not in fact address the current drivers of the lack of rural roll-out.

Finally, given the nature of the high-quality market, it appears highly unlikely that Ofcom's proposals will alter the incentives to roll-out fibre networks to serve these customers.

[26] The proposal to remove the HON in these areas appears a reasonable (if belated) recognition that allowing Openreach to earn supra-normal profits on customers where it does not face competition will reduce investment incentives

4 EXPECTED CONSUMER BENEFITS FROM OFCOM PROPOSALS

As mentioned in Section 1, Ofcom should carry out an impact assessment to ensure regulation correctly balances benefits and costs. In doing so, it should present an analysis of the expected consumer benefit from the new proposals.

As set out previously, just over half of UK households currently have access to UFBB and that proportion is expected to reach around 60% by the start of the new market review period, taking into account operators' announced roll-out plans. The vast majority of these will be in the prospectively competitive areas.

Further investment in UFBB networks will then have two impacts:

- Service customers who currently do not have access to UFBB networks i.e. the remaining approximately 10% of customers in lower cost prospectively competitive areas and the majority of customers in non-competitive areas; and
- Increasing the number of UFBB competitors, presumably largely in the prospectively competitive areas.

The nature of the impact on consumers and users of high-quality services differs significantly between these two forms of investment, and as will be seen, the benefits are expected to be limited. We discuss this in detail below.

4.1 Impact of first fibre network – increasing customers who have access to UFBB

In areas with no mass market UFBB coverage in the absence of further roll-out, customers will not be able to access gigabit services and will have to rely on the existing copper networks. This will have a number of effects:

- A direct loss of economic welfare, in terms of both consumer surplus and producer surplus due to the lack of availability of gigabit services[27];
- Lower quality of service due to the higher fault rate on copper-based networks; and
- Loss of some benefits due to the externalities generated due to consumers having access to gigabit services, for example any increases in economic growth due to efficiency/productivity benefits.

The policy imperative to roll out full fibre networks to households shows there is an assumption that overall these detriments are significant.[28] Even where some customers do not have sufficient willingness to pay for the cost of serving them, the stated policy to achieve 100% coverage implies that externalities are sufficient to offset the cost of rolling out to the "unprofitable" areas.

[27] To the extent there is an incremental willingness to pay for gigabit services which exceeds the future increment costs of rolling out gigabit networks.

[28] https://www.ofcom.org.uk/research-and-data/telecoms-research/broadband-research/economic-impact-broadband

As discussed in Section 3.2, the impact of Ofcom's proposals on increasing roll-out in areas where no network currently exists is expected to be limited. If the driver of the lack of roll-out is that expected revenues do not exceed costs due to a lack of willingness to pay on the part of consumers, the proposals do nothing to alter this. Thus, with the increase in Openreach roll-out being limited, the consequent benefits would also be limited.

4.2 Impact of additional fibre networks – increasing competition in the provision of ultrafast broadband services

In areas which are (or will) be covered by gigabit capable networks, the benefits of additional investment will be largely generated by increases in competition between networks. These effects are more nuanced than the effect of binary availability or not of gigabit networks.

In addition, the degree to which increased competition leads to incremental improvements in customer outcomes is reduced by regulation. This is because regulation is used to proxy the effect of competition where the degree of competition alone is not sufficient to protect customers.

However, on the assumption that regulation is not a perfect proxy for competition, an increase in competition will lead to a range of benefits:

- Increased productive efficiency: as the prices of services becomes increasingly set by the market rather than regulation, operators will have the incentive to minimise costs in order to maximise profits for services existing customers and acquiring new customers;
- Increased allocative efficiency, with lower customer prices as competition between networks leads them to reduce prices towards incremental costs;
- Increased innovation as network operators seek to tailor their services more closely to evolving customer needs; and
- A reduced regulatory burden to the extent that regulation itself imposes direct and indirect costs.

However, the magnitude of these benefits can be expected to be less than the equivalent benefits of moving from no availability to availability[29]. Moreover, the impact of the proposals on encouraging second/third network roll-out is also expected to be limited, as discussed in Section 3.2. Thus, it is again unclear that there would be significant consumer benefits from Ofcom's proposals compared to the counterfactual.

[29] This asymmetry has been recognised previously by Ofcom where it has noted that welfare losses due to investment being foregone are generally larger than deadweight losses if prices are set above cost.

4.3 Increasing competition for high quality services

There is already universal availability of fibre in the high quality/business connectivity market.[30] Thus, the benefits will be due to an increase in competition rather than an increase in availability. In addition, many of these customers already benefit from a degree of competition.

While converged PONs could technically be used to provide both mass market and high-quality services in the future, past experience in attempting to rapidly migrate customers to a single converged network shows there are significant barriers to migration. The availability of a network which can technically deliver convergence is a necessary but not sufficient condition, with significant challenges in the development of supporting BSS/OSS to service corporate customers. Thus, any convergence, if it happens, is likely to be limited in the next market review period.

In addition, many users of high-quality services, such as corporate customers or mobile base stations, are not adjacent to mass market customers. Ofcom analysis suggests the need to dig even a relatively small distance can provide a barrier to switching to a new provider. This will further limit the benefits of mass market roll out on these users.

This suggests the benefits for current users of high-quality services, due to a marginal increase in competition based on increased roll out of mass market ultrafast broadband networks, are unlikely to be significant.

4.4 Conclusion on expected benefits

Compared to a counterfactual where regulation evolves as per the status quo, the benefits from Ofcom's proposals appear to be minimal:

- The largest benefits will accrue from the roll-out of fibre networks in non-competitive areas where none exist currently. However, as the proposals do not address some key drivers for the lack of roll-out (e.g. a lack of willingness to pay from consumers), the probability of higher investment and consequent benefits may be low.
- There would also be potential benefits from increased competition between networks (albeit lower than the absolute benefits of making available a network when none existed before). However, it is unclear that Ofcom's proposals would lead to significant further investment by second/third networks.
- Finally, there are also unlikely to be material benefits for consumers of high-quality services as competition from PON-based solutions is likely to be very limited in the short-term.

[30] https://www.ofcom.org.uk/__data/assets/pdf_file/0015/72303/bcmr-final-statement-volume-one.pdf

5 CONCLUSION

It is not clear that the overall impact of Ofcom's proposals adequately balances benefits of likely increased investment, with the costs of price increases for customers.

The impact on investment will be limited and will benefit a small subset of customers while the costs, in terms of increased prices, will be widespread and will not fall equally on all customers, thereby raising issues of fairness. In particular:

- In non-competitive areas there could be significant price increases which will largely fall on customers who will not benefit (at least in the medium term) from fibre roll out; and
- In prospectively competitive areas the cost may fall disproportionately on vulnerable customers, who again do not directly benefit from fibre roll out and overall there appears to be little benefit from Ofcom's approach in terms of increased investment.

Furthermore, the market for high quality services is distinct and Ofcom's proposals for the market do not significantly increase the incentives to roll-out fibre more generally. At the same time, the proposals will impose costs on consumers that are not already served by multiple networks through higher prices and lower innovation.

Thus, before implementing these proposals, it is important that Ofcom carry out a detailed impact assessment, including a comparison of the expected outcomes with those that would be expected under a counterfactual where regulation evolves in line with the approach to date.

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