Promoting competition and investment in fibre networks – approach to modelling the costs of a fibre network

July 2019

Non - Confidential

Contents

1. Executive summary

Vodafone fully supports Ofcom's desire to increase its understanding of the costs incurred in building fibre networks in the UK. The costs will vary by the business model of the builder: the geography selected, the services they intend to offer consumers, business FTTP, leased lines (to limited sectors or extensively), and the amount of the market they estimate they can feasibly win (building to support 10 or 20 or more percent market share). We support this work stream and we are reassured by Ofcom's statements that this will be used to better inform Ofcom's understanding of where networks are likely to be rolled out.

Given Ofcom's overall strategy and the extent to which it considers competitive fibre networks will emerge, it is important to base forecasts of future roll-out in solid, evidenced economic analysis. In this response we consider the model structure Ofcom have put together and the underlining modelling assumptions inherent within, that may not be able to be flexed in the future. For example the high level assumption that excludes the impact of multi-dwelling buildings in the model. We do not comment on the modelling assumptions that can be flexed in the future (e.g. what services are within scope), as we assume final decisions on these inputs would be made when Ofcom has collected information from builders and worked further on its market definition to support this review.

Whilst we support this modelling exercise and consider it a good first step in developing further Ofcom's understanding of where fibre networks will be rolled out, we do not consider that in isolation this model will be accurate at predicting the future roll-out patterns of fibre network builders. Ofcom's model only represents half the story, seeking to better understand the costs associated with network build. It does not cover the other key business case considerations that will play a significant part in determining where fibre will be rollout out, including an understanding of competitor activity, ability to practically resource network rollout in a specific geography, backhaul to core network and linkages to key regional stakeholders (such as local authorities). These considerations are equally important to understanding the viability and likelihood of fibre investment in a given area.

As part of our response we have included a dynamic commercial decision model, developed in conjunction with CityFibre and TalkTalk and prepared by SPC Networks, that attempts to factor in those other crucial, business case considerations that Ofcom's model doesn't address. The purpose of this model is to capture the real life considerations and factors that operators take into account when rolling out fibre. This model has been devised to allow Ofcom to easily populated it, update it and further develop the model as required.

Taken together we consider the two models to be complementary, with one focusing on the actual costs of deployment. Taken together with Ofcom's own cost modelling exercise, this additional decision modelling exercise will help to provide Ofcom with a more accurate forecast of what the future of network roll-out may look like. We anticipate the next stage centres around Ofcom trying to ensure its assumptions are robust and combining the two models to develop a complete and more realistic view of the likely locations for fibre roll out in the United Kingdom.

2. Question 1 do you agree with our general approach to modelling

Vodafone agrees with Ofcom's high level approach to modelling, considering it to be relatively uncontroversial. However we have a number of comments and questions which we believe would be beneficial for Ofcom to consider and address.

Ofcom state the overall goal and purpose of developing this model is to enable them to understand the costs of deploying a network that offers a range of services over a common underlying fibre infrastructure. Inherent within this, is the assumption that network fibre providers will offer a full range of services, from higher end business services through to consumer broadband services. Is this Ofcom's proposal to only model scale operators that can offer a full range of services across the markets?

Vodafone assumes that as described by Ofcom, the model will be able to model a range of different types of fibre network operators from those offering a full range of services to those simply offering consumer home broadband. It is important for the model to show how the range of services offered influences the unit costs of each service to show how different operator models can compete. It remains the case that most new fibre expected in the UK over the next few years is focused on residential consumers, with CPs deploying PON architecture. This network configuration and service offering is unlikely to appeal to medium to high end enterprise users who will continued to demand dedicated point to point Ethernet services delivered in duct routes (with no overhead drops) and supported by an enterprise grade service wrap. The SPC report we commissioned as part of our access review response on market definition sets out the different demands of users and requirements of networks to support leased lines services. It is vital that any modelling Ofcom conducts takes account of this key distinction.

Allocation Transparency

Ofcom state the purpose of their modelling exercise is to understand the costs of individual services to both residential and business customers provided over a fibre network (and how these vary by geography and scale of network). Vodafone considers it very important that Ofcom be transparent in its costing of individual services which are delivered over a common platform where a high percentage of common costs are present. If the end cost number produced is derived through an arbitrary allocation of costs, Ofcom must be clear that this is the case (with an explanation / justification for each allocation decision) and with sensitivity analysis showing how different allocations impact the end cost. In circumstances where a policy consideration has dictated the allocation policy, again Ofcom need to be clear that this has both occurred and set out a justification for that decision.

Bottom up modelling

We agree with Ofcom's proposal to use a bottom up model, this is in line with regulatory guidance and owing to the lack of availability of actual top down level data, the only real choice available. We do however consider it very important that if Ofcom were to carry out any model calibration with operators' top down data, that the data be sourced from a range of operators and not just one source. We wish to avoid any bias towards one operator – or the derivation of any BT-centric outputs that don't reflect commercial realities for competing communication providers.

We agree with Ofcom's scorched node and a scorched earth approach and the difference between these being calculated and used to further develop and inform Ofcom's policy thinking.

Ofcom explains that it proposes to include FTTP, Ethernet services and dark fibre in its model and to limit the scope of the model to the aggregation node.[1] We consider it important that Ofcom considers the model and network design in light of the business plans of the operators during the market review period. Network operators will have different business strategies from one another. For example due to economies of scale, network costs past the aggregation node that are very marginal for some scale operators, may not be so for other smaller operators. Before Ofcom excludes these costs it should ensure that the costs are not material for all network roll-out models.

Vodafone disagrees with Ofcom's approach to ignore multi-dwelling buildings (multi-dwelling units, MDUs) when carrying out its modelling in a geographic area. Our view is driven by two factors: firstly we believe that the impact of multi-dwelling buildings in an area significantly impacts the modelled costs because MDUs represent an all-or-nothing build, rather than a collection of single dwellings - a large portion of the planning and legal costs are incurred in the final run to the house or building; and secondly because some areas have a very high proportion of multi-dwelling units and this will impact considerable on viability of network roll out, especially if the MDUs are signed up under an exclusive agreement for service from one CP. Indeed it is clear from examples for other countries with more mature residential fibre deployments that the presence of multi-dwelling buildings has had a considerable impact on both the appetite and order that CPs roll out fibre networks.

If Ofcom does want to ignore the impact of multi-dwelling buildings on network roll-out costs, it needs to show that this impact is insignificant. At this point we consider the omission of multi-occupancy buildings to be a significant error and reduce the accuracy of the model output.

[1] When Ofcom use the term 'aggregation node' they need to clearly define it. In Ofcom's consultation its definition is in paragraph 2.11, but the Cartesian document, uses it in the context of a splicing location in the fibre network where different cables are aggregated together.

3. Question 2: Do you agree with our approach to forecasting service volumes?

Ofcom state that in their approach to forecasting service volumes they make assumptions about the scale of network deployment, i.e. how many premises are reached in the long run, and the speed of network deployment. Vodafone considers it vital that Ofcom acknowledge the difficulty inherent within this assumption. If this assumption is widely out of alignment with the actual outcomes then Ofcom's approach and remedies may be wholly inappropriate. Placing emphasis on a projected end state at the start of a model's calculation run, when the entire purpose of the model is to help determine end state investment outcomes, introduces a circular point of weakness in the workings of the model.

While Ofcom indicate that this initial end state projection will be informed by operator business plans and forecasts, this statement in itself is cause for deep concern. Over the past decade we've seen numerous bullish fibre investment press releases being issued, which make bold coverage claims. Many of these have failed to materialise. Whilst these plans and announcements may have been released in good faith, it would be wrong to base model output on ambition alone, especially when there is strong evidence to suggest the ambition often differs considerably from reality, as plans are delayed, recast, scaled back or even abandoned altogether (often quietly, without further public comment).

The dynamic model that we submit with this response will allow Ofcom to understand the rationale behind operators plans and develop a better understanding of the factors that operators consider when making those plans. With this information Ofcom could make their own assumptions and adjust and update business plans as they deemed appropriate as industry dynamics change.

We consider it important for Ofcom to gather and review actual evidence of roll-out verses operator's plans. In 100% of cases we have looked at forecasted fibre roll-out has been delivered later and incurred more complications than initially predicted or forecast.

We are very interested in Ofcom's comment regarding the incumbent's use of a regulated EOI product. Ofcom state:

> *"We consider it likely that an incumbent operator can roll-out faster and achieve greater coverage than an entrant operator. In part, this is due to its ability to utilise existing duct infrastructure in a more effective manner than an entrant"*

We share Ofcom concerns over this matter and believe that Openreach will have a considerable advantage over other Communication Providers. While Ofcom have required duct and pole access be provided on an EoI basis, we share Ofcom's concerns that in reality Openreach will find it far easier to utilise these assets

than other CPs. We would welcome Ofcom spending further time to understand, articulate and effectively remedy these EoI concerns. Only when Ofcom and other CPs have full confidence that DPA has been supplied on a genuine EoI basis will this barrier be overcome.

Vodafone would like to highlight the following issues with regards to forecasting individual services:

Leased Lines

We understand that Ofcom considers that new large-scale fibre networks will provide all fibre services, including leased lines, therefore the model will have the capability of estimating the costs of deploying leased line services as an addition to FTTP deployment (i.e. as part of a multi-service network). Considering not all Leased Lines are Ethernet, for example there is access for broadcasters, street furniture, 5G densification and CCTV services. These all need to potentially be included in the volume forecast and will have a specific local geographic impact

We recognise that the market conditions are different for leased lines and FTTP, so we expect different take-up profiles for leased lines compared to FTTP. However the leased line product market is undergoing a transformation. Dark fibre is quickly becoming the preferred industry wholesale product of choice and capacity growth in mobile backhaul and the business markets are driving change. The artificial pricing gradient that Openreach have established and that has been a feature of this market historically may be changing. Ofcom need to clearly consult and gain a range of inputs in order to establish a forecast for this product market and assumptions for future market developments.

Vodafone notes that Ofcom's table 1 in their consultation detailing the consolidation of ancillary services contains a scenario unlikely to be encountered, namely Leased Line CP to CP migration (same network), since CPs tend to have different end points for the network ends a simple migration is unlikely.

One data set that would be extremely useful is information from network builders regarding the leased lines they plan to sell, the business segments they will be focussing upon, the volume of the market they seek to serve, their support services and if they plan to roll out these services on day one or as future incremental service options following on from success in the FTTP market. The question to ask competing network operators is how will the services rolled out in the business market compete with Openreach and which support services (i.e. 24x7 network operations and repair facilities) will be available.

FTTP:

Like Ofcom we have no crystal ball regarding the success or otherwise of future FTTP deployment. Given the scale of the challenge ahead and the amount of investment required, it is entirely feasible that the FTTP rollout phase will last longer than a decade. Business cases and plans tend to look over a shorter time horizon, with 10 years considered long by business case standards. We consider this period more of an arbitrary cut off point for business planning purposes, rather than ground in commercial or practical roll out realities. As such to reach a more realistic outcome we have concerns about some of the assumptions being pushed out beyond 10 years – as the asset itself will have an economic life far in excess of this.

Passive access products:

When forecasting all future service demand and especially passive access product demand Ofcom must consider the dynamic effect. Ofcom's chosen strategy for this market entails huge dynamic change, increased investment, the creation of many fibre networks and a reduced reliance on the services of Openreach. All of the changes will impact on each other, for example if many operators are seeking passive access products the availability of passive access may well reduce, if Ofcom's regulation of Openreach's services reduce and Openreach are able to control its own prices this will also impact investment. Ofcom need to fully consult on these issues and consider a wide range of industry input and data.

4. Question 3: Do you agree with our approach to network dimensioning and costing?

Ofcom explain how the final 10% of the country, the postcodes with the highest cost per premise are excluded from the analysis with the assumption that they are likely to receive state funding. It would be useful to understand the modelling impact of this exclusion. Ofcom suggests that fixed wireless access could be used for this purpose, even so this still requires fibre to be provided to necessary points in the access network. Therefore if an area with an existing subsidy for G.fast is developed with fixed wireless access a network provider would still incur the costs for rolling out fibre to the fixed wireless access sites.

While we believe the issue of state funding has to be considered very carefully (given the long economic life of fibre, the lack of competition and the wider economic benefit to BT of being the UK's ubiquitous access network), it would be wrong to include these premises within the model and risk skewing the results to the point where they cease to be relevant for mainstream business investment. Fibre deployment in deep rural areas is more expensive, but with no competition and a long asset life it could still be achieved without state funding.

Ofcom suggest[2] that coverage starts with the lowest cost per premise areas and shows a graph illustrating a cost curve for premises past. However coverage and geographic areas do not always fall into these categories clearly and in covering one area it may actually be incrementally economic to cover another area that is in and of itself uneconomic. This may mean that roll-out to some of the final 10% (excluded by Ofcom) may in fact be more economical than it appears in isolation.

[2] Ofcom's consultation footnote 8

Ofcom's model includes calculations for the fibre cabling and connections used. These will be different for FTTP, leased lines and dark fibre and be different depending on how operators roll-out their networks. For example alternative network providers tend to use above-ground cabinets to house network splitters and connectorised fibre, rather than the duct splicing approach being modelled. The reason for this is that it gives them flexibility to deploy just the civils and tubing to the end user boundary boxes at the fibre roll-out stage, and then install the fibre only at the point of order. This means that segment 3 civils and fibre is split into 2 distinct tasks; homes passed and then homes connected. Does the model consider these alternative build approaches?

In addition although FTTP services require fibre splitters to be installed, leased lines and dark fibre services do not. Have Ofcom considered the different fibre cabling requirements of these services and the degree to which they can and cannot be aggregated together.

The Ofcom model also includes assumptions regarding new duct and the cost of using the regulated duct and pole remedy. When an alternative network provider uses the duct and pole remedy they incur additional costs in running fibre and ducting (and connection chambers) from their network into BT's. We discussed this in our response to Ofcom's BCMR consultation[3] and have developed an internal project that is focused on calculating these costs, as they are significant. For an alternative network provider using the regulated duct and pole product there are also rental charges for duct space, facility hosting, spare coil hosting, and other ancillary network charges. Have Ofcom considered these and allowed these to be sense-checked and incorporated into a per metre charge or other more representative metric?

We have a number of other questions that all relate to how the network is dimensioned, structured and technically specified, these are listed below and related to the Cartesian document that accompanied Ofcom's consultation:

- Figure 3 and figure 5 detail the number of fibre cables used, however it appears that no spare cables are reserved for maintenance or expansion – are there any modelling parameters that allow for expansion over the term of the build e.g. 25% new homes in an area. Similarly, modelling as multiple 36-fibre cables for different services could over-estimate cable pulling costs and space occupied in ducts, where an efficient operator would right-size for 72, 96, 144, 288 fibre cables and pass-through or loop joint as needed.
- In Figure 3 Segment 3 some alternative network providers are deploying micro-duct to the edge of the public land by a property, and then blowing or pushing fibre from the business or home as part of the connection task. Is this considered in Ofcom's model?
- In the model leased lines are distributed between exchanges, is this allocation done in an arbitrary manner? As discussed previously in cases where assumptions or arbitrary allocations are used it would be useful for Ofcom to show the impact of these is not material.

[3] Our BCMR 2019 response

- The model includes an assumption for the number of fibres that both optical services and dark fibre services use with 2 fibres used per service; however single fibre working is possible for these, and should be the starting point for modelling, with sensitivity analysis allowing variation for a proportion to be 2-fibre circuits.
- The Geospatial model uses the Input Road Network and produces the Geo-Type classification which drives the assumption for what type of digging is required. This is the biggest driver of trenching cost. There is no detail offered by Cartesian on the process of mapping from the road network to GeoType, and the full consultation should cover this in much more detail including provision of data for checking. Inaccurate modelling here will fundamentally alter costs for build.
- The model includes a routing factor assumption of 1.4 but without citing any source. Previously Openreach have used x1.6 (EAD 25km radial, 40km road), so Ofcom should show sensitivity analysis of different routing factors from 1.2 – 1.8.
- In paragraph 6.22 Cartesian take the total distance of fibre and divide by 36. We are concerned that if the distance is from furthest premise to the closest, then dividing by 36 may underestimate the cable metres needed.
- In paragraph 6.31 footnote 20 indicates that the average distance between poles is 50 metres. We would like to know the source of this assumption and justification for using 50 metres. Again, sensitivity analysis should demonstrate how material or otherwise this value choice.

5. Question 4: Do you agree with our approach to cost recovery?

Vodafone considers it too early and without sufficient information to comment on this question. We appreciate Ofcom highlighting the different approaches to cost recovery and await further information from Ofcom as to how it actually proposes to recover the costs of network build from the services supplied by the network.

We do not consider anything discussed in Ofcom's consultation on cost recovery to be controversial, however our over-arching point is that it would be very useful for Ofcom to model the impact of the different approachs to the actual calculated costs of each service. This would enable stakeholders to really engage in the importance of each cost recovery assumption.