# Tariff structure of access to duct and pole networks

## 1 Executive summary

The de-facto charging approach for regulated duct and pole access is one that reflects the network elements used by the access seeker. This is in stark contrast to the premises connected tariff structures that are most commonly applied to downstream regulated access products, all of which are charged on the basis of a fixed recurring price that is the same for each premises connected to the access product.

We have been wondering how and why this mixture of tariff structures have come about and whether it makes sense today and going forward. In this note we explore the two different tariff structure options for duct and pole access:

- Network usage-based tariffs and
- Premises connected-based tariffs.

On its face, it would seem that the premises connected-based tariff structure is easier to implement and operate and it may also potentially create less competitive distortion. If that is the case, what is stopping regulators from using that approach?

Whilst it may be complex to transition from one to the other, the first step should be to understand which tariff structure is preferable. To determine that, it is important to clearly articulate the objectives sought when mandating regulated access to physical infrastructure.

We hope this paper can contribute to that discussion.

## 2 Introduction

Access to duct and pole networks belonging to the incumbent operator is crucial in many markets as it is often inefficient or uneconomic for competing operators to replicate these assets. Such

access is therefore regulated in many countries including the UK and in several EU member states[1], to promote competition in downstream markets for active wholesale and retail services.

Pricing is a key aspect of regulated duct and pole access; this paper considers alternative structures that could be adopted for the regulated tariffs and compares them to the tariff structures that are typically used in the downstream wholesale and retail markets, considering the question of whether it would be appropriate for the structures to be aligned between downstream and upstream markets.

We have observed that the tariff structure of duct and pole access is generally proportionate to the distance of the incumbent's ducts or number of the incumbent's poles used. This contrasts, however, with the other tariff structures for regulated wholesale services such as unbundled local loop, virtual unbundled local access and bitstream services. These tariffs in general do not vary by the location of the premises within a geographic area; rather than being based on the amount of the incumbent's network used, a single tariff is set for each premises connected/end-customer served.

This mismatch between the tariff structures for duct and pole access, and downstream wholesale and retail services does not appear to us to have been widely discussed. Yet it would seem important to understand the rationale for fundamental differences in tariff structure along the supply chain, as this may lead to competitors being placed in a margin squeeze at some point along the supply chain. So, while we have been unable to find examples of the tariff structure of pole and duct access being consistent with that for downstream wholesale and retail services, it seems a relevant and important question. Below we look at pros and cons of using network usage-based or premises connected-based charging for duct and pole access.

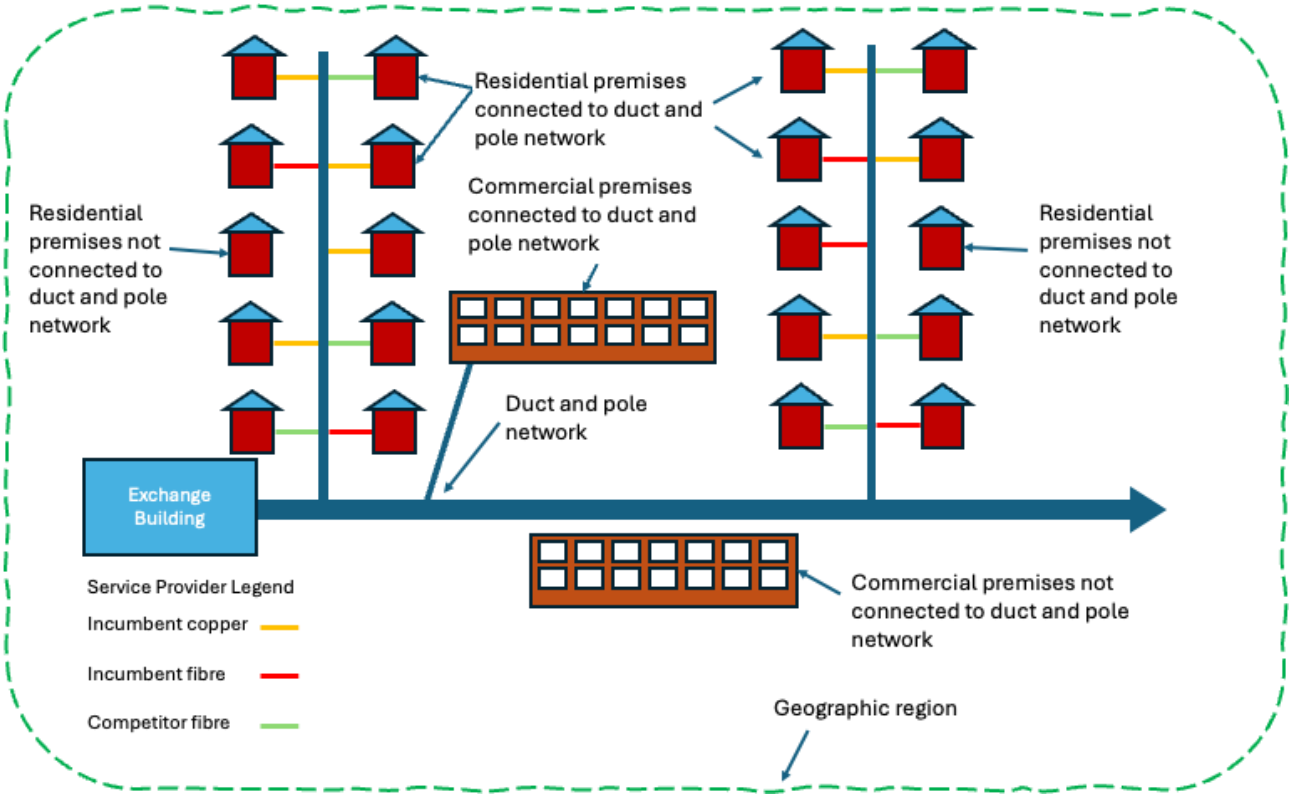
# 3 Tariff structure options

The following diagram shows the key elements of a copper or fibre access network.

Diagram 1 shows residential and commercial premises, connected and not connected to a duct or pole network. It also shows that, of the premises connected to the duct or pole network, some have

[1] BEREC Report on Access to physical infrastructure in the context of market analyses, 13 June 2019, Table 4, page 10, reports 22 member states plus the UK impose cost oriented regulated access to ducts, poles and manholes. This is most recent survey on the regulation of physical infrastructure across the EU.

telecommunications services provided by the incumbent's fibre and copper networks, and others have services provided over a competitor's fibre network, both of which are deployed within the duct or pole network.




These ducts differ in size, where the greatest diameter duct is connected to the exchange building and tapers to smaller bores toward the end-user premises. The duct network also includes other elements such as access chambers (not shown in the diagram) that enable cables to be drawn through ducts and cable jointing. Operating costs, such as maintenance, are also important.

The observed tariff structure based on the amount of the incumbent's network used can, therefore, include a large number of elements.

## 3.1 Physical network-usage tariff structure

The most common structure of tariffs for regulated duct and pole access observed in the market is based on the amount of the incumbent's network the access seeker uses. The price elements of this tariff include a price per unit length of duct or number of poles used (the tariff for duct usage is sometimes tiered by the diameter of the cable used and/or the number of occupied sub-ducts), with additional charges such as for the number of access chambers used.

This tariff structure is generally derived from the proposition that the amount of network used is a cost driver. This in turn serves as a basis for allocating the cost of ducts and poles to the defined regulated access products to determine the unit charges payable by the access seeker.

## 3.2 Premises –connected-based tariff structure[2]

In contrast to a network usage-based tariff, a premises connected-based tariff would be a fixed recurring price that was the same for each premises connected by an operator using the duct and pole network, and charged equally to the incumbent's downstream businesses and competitors according to the number of connections each provides to end customers.

A cost-oriented recurring price could be calculated by dividing the cost of the duct and pole network by the number of premises within the geographic region. Ideally, those premises that are not "actively connected" to the network would be excluded from this calculation of the tariff.[3] The relevant geographic region of the infrastructure network could range from a single national region that encompasses all local access networks across the whole country through to smaller regions covered by individual local access networks. The choice of region size could depend on a range of factors, such as the geographic dimension of the market definition and whether there is infrastructure competition or not, variations in the density of premises between say rural and urban regions, and whether state aid is used to facilitate fibre network deployment. For the present discussion it is assumed that there is a single national geographic region that encompasses all local access networks across a country.

[2] ComReg, the national regulatory authority in Ireland, considered pricing access to ducts for Ireland's National Broadband Ireland (NBI) on a "per customer" basis. Instead of a tariff based on the duct capacity that a cable occupies, it considered a "per customer" tariff structure based on the number of premises connected to Eircom's duct within a geographic area. ComReg concluded by not adopting the "by customer" premises-connected tariff structure, because of 'implementation issues': ComReg report "*Pricing of Eircom's Civil Engineering Infrastructure ('CEI') CEI access in the context of the National Broadband Plan ('NBP')*" 09/09/2020, had proposed, paragraph 26,

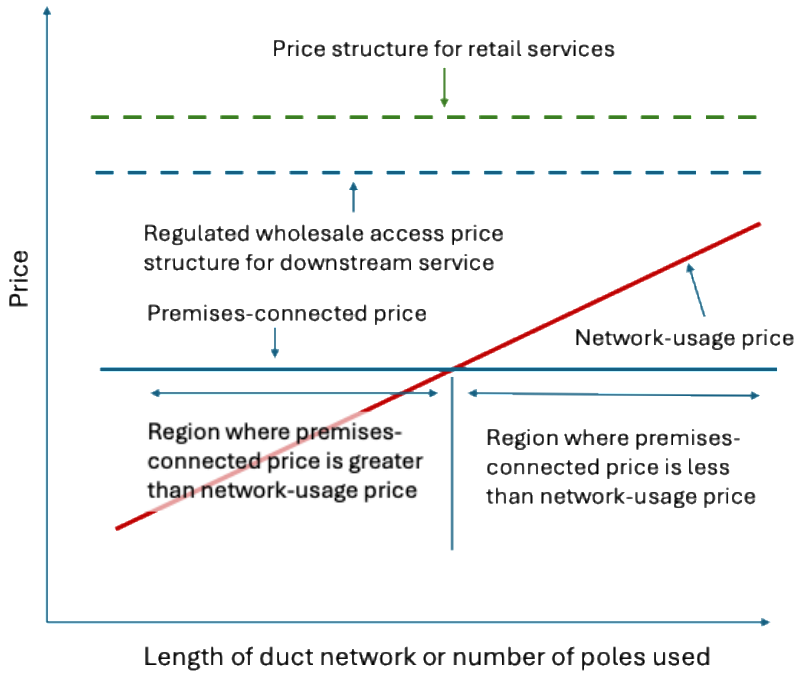
[3] It is possible that some competitor networks which make use of incumbent ducts and poles for new fibre deployment may also own a large legacy network which are entirely accommodated in its own infrastructure (for example, cable TV networks). In this case it would be necessary to ensure that the "active connections" include only new deployment and not the connections to the legacy network.

# 4 Pros and cons of network usage-based and premises-connected tariffs for duct and pole access

A premises –connected-based tariff structure would be more aligned with the structure typically seen for regulated downstream wholesale (such as unbundled local loop, virtual unbundled local access, or bitstream) and retail services.

Although this approach represents a departure from granular cost-causality at the individual circuit level, as distance is a causal driver of costs for many of the assets, it would be at the same level of averaged cost-causality as regulated downstream wholesale access products.

The following illustration compares the two approaches to duct and pole access tariffs with the associated downstream wholesale and retail access pricing structures.




A premises connected-based tariff structure for ducts and poles access would result in a constant margin between retail and wholesale products throughout the value chain, whereas the current network usage-based tariff structure results in differences between the margins in that value chain between densely and less densely inhabited areas.

We consider next how these and other key factors affect the relative merits of the two tariff structures.

## 4.1 Recovery of efficiently incurred duct costs

Both tariff structures could allow for recovery on duct and pole costs. However, the network usage-based tariff requires use of current usage volumes (i.e. duct distances, number and diameters of cables or subducts, numbers of manholes and numbers of poles) for each category of infrastructure, as well as forecasts of all of those over the relevant charge control period. This is a complex process, raising the risk of forecasting errors that result in prices that either under or over-recover costs.

For the premises connected-based tariff, it is necessary to have current and to forecast actively connected numbers of premises within the relevant geographic area. This is simpler to provide and forecast than forecasting the number, diameter and other parameters of the copper and fibre cables that may use the duct and pole network in the future, and is likely to remain relatively stable over time.

Although there is a potential for errors in the forecast for active connections, we expect that, overall, the premises connected-based tariff forecasting inaccuracy risk is lower than for the network usage-based tariff. It would, therefore, seem that there is a higher probability of accurate cost recovery using the premises connected-based tariff structure.

## 4.2 Competitive neutrality between operators using ducts and poles

There are two ways in which the use of a premises connected-based tariff could affect competitive neutrality compared with the network usage-based tariff.

First, an operator targeting less dense areas (with greater distances of duct and number of poles per customer) would pay less than the actual cost of the infrastructure used, whereas an operator targeting more dense areas would pay more than the actual cost. A similar distortion occurs where the relative proportion of underground to overhead cabling varies, as the costs of ducts and poles are materially different. This does, however, bring the duct and pole pricing into line with the pricing approach taken in the downstream markets, which has a similar departure from cost orientation.

Second, operators that gain greater market share faster will pay the same per customer under a premises-connected tariff as those with a slower take-up. This means that the duct and pole prices paid by operators will align with the revenues received from end customers more closely than with the underlying costs of network deployment. This may be considered an advantage compared with the network-usage tariff in a situation where incumbents, due to their established market position,

are able to more rapidly acquire fibre customers than new entrants starting from scratch; it provides an incentive for competitive entry.

However, the competitive neutrality of premises-connected tariff may depend on whether an entrant is required or decides to build additional duct network to access the incumbent's duct and pole network. This would mean that the entrant would incur this build cost in addition to paying the same premises-connected tariff charges as the incumbent. This may occur, for instance, if the entrant does not use the incumbent's exchange buildings as the local centre for its own fibre network.

The network usage-based tariff structure can also cause competitive distortions. The most obvious is that it is easier for larger operators, particularly the incumbent, to present a nationally averaged retail price to end-users because the larger operators typically have a mix of all the different types of premises connected, whereas smaller providers focusing on more sparsely populated locations would be at a relative disadvantage.

Additionally, the averaged premises connected-based tariff structure would also be likely to make it more viable for competitors to deploy full-fibre networks to more sparsely populated premises, reducing the need for government subsidies and promoting digital inclusion of citizens in rural and less densely populate parts of the geographic area.

If the policy objective is to promote competition in all parts of the country and at infrastructure level as well as in downstream markets, then these are important considerations.

## 4.3 Cost neutrality in migration between copper and fibre services

A potential issue with the network usage-based tariff is that the underlying duct and pole cost would need to be reallocated from copper cable to fibre as copper is withdrawn. This is because the initial unit price for the network-usage-based tariff would have been calculated taking account of existing duct and pole occupancy by copper cables. Removal of copper cables would reduce the overall network occupancy, resulting in a redistribution of the duct and pole costs and could lead to pricing instability.

The premises connected-based tariff, however, would be more technologically neutral in the transition from copper to fibre services as the charge for duct cost would be the same irrespective of whether the premises are served by copper or fibre cable. This is because the removal of copper cables does not change the cost per premises calculation, described in subsection 3.2 above.

## 4.4 Incumbent incentive to invest in additional duct capacity

Both the network usage-based and premises connected-based approaches should provide the incumbent an economic incentive to deploy additional duct and pole network as required.

In the case of the network usage-based pricing, it aligns with the treatment of cable deployment as a cost driver. In the case of the premises connected-based tariff, it is the number of premises connected to the duct and pole network that determines the size of the network. An increase in the geographic footprint covered by the network because of, say, a new property development would increase the number of premises over which to recover the duct and pole costs, which should provide an incentive to invest in additional capacity.

## 4.5 Impact of premises not connected to the duct network

An additional factor to consider is whether premises are not connected to the duct and pole network, but instead are connected to, say, a fixed-wireless or a totally separate cable network.

For the premises connected-based tariff, changes in the number of premises connected (new connections or disconnections from an existing the duct and pole network) need to be recorded in order to derive the cost per premises connected. This would require that both the incumbent and access seekers keep a record of all premises actively connected to the duct and poles network.

## 4.6 However, as the network usage-based tariff does not use the number of premises connected, changes in the number of premises connected, *per se*, should not impact its pricing. Practicality and ease of operation

Network usage-based pricing is extremely complex to operate, as it is necessary to separate the costs of the various components of the incumbent's duct and pole network and align those costs with the various products in the tariff sheet. Forecasting the usage of these components over the relevant charge control period is also a complex and uncertain process.

An initial appraisal of the premises connected-based tariff structure, however, suggests that it would be relatively less complex to operate. There would be no requirement to separate the duct and pole costs into different components, and the tariffs would be more easily calculated from a forecast of connected premises.

## 4.7 Use of duct and pole network by non-broadband services

The preceding discussion has assumed that the cables deployed in the duct and pole network are to connect similar products, particularly broadband access, to residential and business premises.

However, the duct and pole network is also occupied by cables used to provide different services such as inter-exchange connectivity, leased lines or cell-site backhaul. These services may involve point-to-point fibre links rather than the shared fibre typically seen in broadband GPON networks, so they may use more passive infrastructure per connection than broadband access, and some do not involve a connection to end-user premises.

The network usage-based tariff can accommodate these additional scenarios by simply using the same product set and tariffs which would align with the actual usage of the infrastructure by these services.

The premises connected-based approach could be extended to cover these use cases by treating network nodes, such as cell sites or exchange locations, as premises. It would also be possible to differentiate the tariff structure so that different services incur different tariffs; this would allow duct and pole charges to more closely align with service revenue, but at the expense of greater complexity in the tariff-setting process as well as the operation of the duct and pole access service.

## 4.8 Comparison between network-usage and premises-connected tariffs

Below is our at-a-glance summary of the two tariff structures and the how they perform against the parameters we have identified.

| | Network usage-based Tariff | Premises connected-based Tariff |
|---|---|---|
| **Recovery of efficiently incurred duct costs** |  |  |
| **Competitive neutrality between operators using duct** |  |  |
| **Cost neutrality in migration between copper and fibre services** |  |  |

| | Network usage-based Tariff | Premises connected-based Tariff |
|---|---|---|
| **Incumbent incentive to invest in additional duct capacity** |  |  |
| **Impact of premises not connected to the duct network** |  |  |
| **Practicality and ease of operation** |  |  |
| **Use of duct and pole access by other services** |  |  |

# 5 Concluding remarks

Our analysis highlights that the network usage-based and the premises connected-based tariffs have their own pros and cons, which create different economic incentives for the incumbent and competitors and result in different risks.

In order to assess more fully whether the network –usage-based tariff is more or less appropriate than premises –connected-based tariff, it is important to identify the policy objectives and priorities. For example, is there a policy objective to promote competition in all parts of the country and at the infrastructure level as well as in downstream markets? In addition, it is important to determine the feasibility of implementing, particularly the premises-connected tariff, given the available network and customer information.

# 6 Our team

## Gita Sorensen, Managing Director GOS consulting.

Gita has more than 30 years of experience in telecommunications regulation and has held industry positions of Director of regulation, interconnection, and wholesale, before moving into consultancy. As a consultant, Gita has advised operators, regulators and investors across the world on a wide range of regulatory policy and strategy issues.

## Tom James

Tom James was Head of Competition/Regulatory Finance at BT Group from 2011 to 2019 and previously held finance and regulatory roles at a number of UK and multinational telcos. He has particular experience in the theory and practice of cost measurement, modelling and reporting. He is a fellow of the Institute of Chartered Accountants in England and Wales (FCA).

## Dr. Antony Srzich

Antony is a regulatory economist with over 25 years' experience in the telecommunications sector. He has worked in management and regulatory roles for an incumbent operator and a wholesale-only operator, as a senior advisor for a regulator, and as a consultant. Through these diverse roles, Antony has gained a unique combination of management, technical and regulatory economics experience.

## Jonathan Kingan

Jonathan Kingan is a highly experienced senior consultant in regulation, strategy and technology in the ICT sectors. He works internationally with clients in 30+ countries who have valued his combination of business and technology expertise. Jonathan runs JJK Associates Ltd (a network of independent consultants) and is an associate of GOS Consulting.