

# European success in achieving very high capacity networks: a process of trial and error

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## Policy background

### Services- vs network-based competition

In the period up to 1998 in the EU, local fixed telecommunications markets were closed to competition by law. When that restriction was lifted, policymakers had to choose their preferred industry structure and the form in which competition would be introduced. There are two forms of competition that can be achieved for network services that exhibit significant economies of scale and/or scope. These are either services-based or infrastructure-based competition. Services-based competition occurs where an entrant uses the existing infrastructure that enjoys economies of scale and scope (effectively sharing those scale economies with the network owner) to address retail customers, while infrastructure-based competition implies that the entrant operator eschews the incumbent infrastructure altogether and builds its own network, thereby seeking to replicate the economies of scale and scope enjoyed by the other network.

Issues arise as to whether scale economies arise over the whole of the production output or only a part of it; and, if so, what is the extent of those scale economies, namely, is there room for two or more network operators on any given market?<sup>2</sup> Economies of scope are said to exist if the joint production of several outputs is cheaper than the production of the same outputs by means of separated specialised firms.<sup>3</sup> In the case of telecommunications networks, economies of scope exist where several products use the same inputs (telephony, broadband and broadcasting all use the same network, for instance), implying that costs can be shared across multiple products. While these economies of scope arise whenever a network is replicated (that is, in the case of infrastructure-based competition) when services-based competition is the form in which competition emerges, significant issues arise concerning the allocation of costs across different services when determining an appropriate access price.

### The role of wholesale access

Competition in fixed telecommunication markets is related to the presence of a distinct downstream segment (the retail market which involves the provision of services to final users) which is potentially competitive depending on the extent of available access to the upstream market (wholesale access infrastructure, that is, the so-called 'last mile') which has significant scale economies and has therefore historically tended towards monopoly or oligopoly outcomes. Whereas access competition can take many different forms, infrastructure-based competition occurs where the competitors rely on their own infrastructure rather than on the access infrastructure of the incumbent; it is this latter form of competition that is typically preferred by policymakers. This is because experience has shown that the benefits of end-to-end infrastructure-based competition far outweigh those of services-based competition in the long run.<sup>4</sup>

However, while infrastructure-based competition is the most powerful form of competition, it can require longer timeframes to be implemented and significant investments by the competing firms. The alternative, and quicker, solution is to foster a services-based competitive model in which competitors use the incumbent firm's access network to provide their services. The level of required investment is less, and the development of a competitive market is quicker, but there are a number of drawbacks, not least of which is the importance of the regulator in sustaining a competitive dynamic. The importance of the regulator and the regulatory regime arises because setting appropriate access points and determining the correct access prices at those access points are critical to the success of the business model. Another significant risk in setting access obligations and associated pricing is the risk of undermining infrastructure-based competition from emerging networks by distorting the build/buy signals in the market, for instance, by setting cheap and easy access conditions that enable service-based entry in the short term but will undermine investment in expensive infrastructure in the medium term. Even if priced correctly, accounting for risk preferences is extremely problematic. For example, how

1 Director at TELAGE. The author is extremely grateful to Peter Alexiadis for comments and edits. Any remaining errors are his own.

2 Minimum efficient scale is not normally estimated in markets but in mobile network markets, the European Commission estimated a minimum efficient scale of 20 per cent market share suggesting that up to five network operators are possible in most markets. See section 5.2.3 of the Explanatory Note (SEC(2009) 600) accompanying Commission Recommendation of 7 May 2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU (2009/396/EC).

3 William J. Baumol, John C. Panzar and Robert D. Willig, *Contestable Markets and the Theory of Industry Structure* (Harcourt Brace Jovanovich, Inc: New York, 1982).

4 See for example, Michał Grajek and Lars-Hendrik Röller, 'Regulation and investment in network industries: evidence from European telecoms', *Journal of Law and Economics* 55(1) (2012) 189–216; Martin Cave, 'The ladder of investment in Europe, in retrospect and prospect', *Telecommunications Policy* 38(8) (2014) 674–683; Marc Bourreau and Pýnar Dođan, 'Service-based vs. facility-based competition in local access networks', *Information Economics and Policy* 16(2) (2004) 287–306; Lars-Hendrik Röller and Leonard Waverman, 'Telecommunications infrastructure and economic development: a simultaneous approach', *American Economic Review* (2001) 909–923.

does a regulator take account of the preference of a putative investor to avoid risking capital up front in the presence of technological choices? While risk options are available in theory, they are extremely difficult to value so as to render access prices either credible or effective.<sup>5</sup>

Of course, a prerequisite for services-based competition is some form of mandatory access to the incumbent network so as to allow competitors the possibility of using the access network on reasonable conditions. This is not a simple exercise for the regulator, because the incumbent has both the incentive and the ability to engage in anticompetitive behaviour, either in the form of price or non-price discrimination. Price discrimination consists in the charging of excessively high wholesale prices to competitors (or classes of competitor) or in applying predatory prices to its own retail customers in order to drive new entrants out of the market or to severely curtail their ability to compete in the market. A large number of non-price-based forms of discriminatory behaviour are also available for putative monopolists, many of which involve the quality of service offered to other firms and usually identified under the catch-all heading as ‘non-price discrimination’.

A slew of regulatory obligations have existed in the EU which National Regulatory Authorities have been imposing on dominant firms since the adoption in 2002 of the EU regulatory framework for electronic communications. These obligations are consolidated in Articles 68 to 74 of the 2018 European Electronic Communications Code (EECC)<sup>6</sup> which came into effect in December 2020, and can only be imposed when dominance has been identified. These obligations are imposed precisely so as to control not only price, but also non-price, discrimination. However, there are concerns as to the efficacy of these obligations to control price discrimination and, more critically, to control non-price discrimination.

### **Business separation foreseen**

It is to deal with such concerns that regulators have historically seen forms of business separation as an effective way to deter and to detect the more pernicious forms of undesirable behaviour. Martin Cave (2006) suggested a classification system<sup>7</sup> in which a first step is accounting separation, which requires separate accounts for the separated branches to allow the regulator to detect wholesale margins that are too high or retail profits that are too low (indicating excessive wholesale access prices applied to competitors or predatory prices in the downstream segment). Other pricing rules have been developed at length by the European Commission in recent years to protect against other price discrimination concerns, notably on the

pricing of copper and also the appropriate mechanisms for testing whether a margin squeeze is occurring.<sup>8</sup>

However, even if price discrimination<sup>9</sup> can be detected despite these solutions, and other concerns arise in relation to the allocation of costs where scope-economies are present, non-price discrimination will continue to be much more difficult to identify, detect or remedy. Insofar as these difficulties prove to be intractable, the rationale for considering the use of more aggressive forms of business separation in telecommunications is probably established.<sup>10</sup>

Separation can take a number of forms,<sup>11</sup> which range from accounting separation to the extreme option of ownership separation (whereby the incumbent has to divest the access network, such that the legal ownership of the network and the rest of the firm operates through different entities) which has been implemented in some countries for other network industries (for example, electricity). There are several reasons why many analysts do not consider mandated structural separation to be a suitable option for telecommunications operators, the most important of which relates to the lack of a natural monopoly boundary in telecommunications networks especially because of changes to technology and the ability to exploit economies of scope, along with the functional coordination that is required across ownership boundaries. The need to make significant investment decisions and to co-ordinate those decisions between different business segments (retail/wholesale) in a complex technological environment raises particular challenges.<sup>12</sup>

By contrast, in other network industries, a clear natural monopoly boundary can be identified. For example, there is no realistic proposal to duplicate the electricity wires in electrical distribution networks since the costs of replication would be so great as to vastly outweigh the benefits of competition. A similar dynamic exists in water or gas distribution. However, in telecommunications networks, technological change affects the areas where such natural monopolies might be said to exist. Forty years ago, one might have asserted that the copper network was a natural monopoly for voice telephony and this observation might even have been true at a certain point in time, but the introduction of mobile telephony and the adaption of cable

5 See, for example, A. Dixit and R. Pindyck, *Investment under uncertainty* (Princeton University Press, 1994); Fernando T. Camacho and Flavio M. Menezes, ‘Access pricing and investment: a real options approach’, *Journal of Regulatory Economics* 36(2) (2009) 107–126.

6 Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code (EECC).

7 Martin E. Cave, ‘Six degrees of separation operational separation as a remedy in European telecommunications regulation’, *Communications & Strategies* 64 (2006) 89.

8 Commission Recommendation of 11 September 2013 on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment (2013/466/EU) (‘the NDCM Recommendation’).

9 Note that not all price discrimination is harmful; see, for example, Damien Geradin and Nicolas Petit, ‘Price discrimination under EC competition law’. In *The Pros and Cons of Price Discrimination* (The Swedish Competition Authority: Stockholm, 2005) 21–63.

10 The first non-price discrimination case in telecommunications concluded by the Commission was in 2011: Case COMP/39.525 *Telekomunikacja Polska*. Price discrimination is also not without its challenges, as seen in the *TeliaSonera Case* – see Nicolas Petit, ‘Price squeezes with positive margins in EU competition law: economic and legal anatomy of a zombie’, available at SSRN 2506521 (2014).

11 Martin Cave, Note 7 above, at page 4.

12 Investment coordination was largely the reason why telecommunications firms remained integrated after liberalisation; see, for example, OECD (2003-11-03), ‘The benefits and costs of structural separation of the local loop’, OECD Digital Economy Papers, No. 76 (OECD Publishing, Paris). However, the disintermediation of network and services is likely to affect this discussion.

tv networks to provide telephony services created competing access links. There are other examples in other service markets, but what is important is the fact that technological change introduced over time means that the boundaries between competitive provisioning and 'markets' shift, often considerably, in the telecommunications sector.

The ability of an integrated firm to be able to avail itself of economies of scope is an important related issue. Again, over time, new services can be developed that can be delivered over existing infrastructures. Since the input and the input cost is common (that is, from the same network), the incentive to develop new services for consumers is very high since the new production process is virtually free. If provided through a separate entity, the service provider would contract for access for the service, while new services would require a new access agreement and the incentive to develop the service would necessarily be weakened.

This loss of incentive to develop new services would be exacerbated where significant changes to the network would be required to deliver the services. The investments (and associated risks) would be with the network owner, while the potential gains – if the new service is successful – would lie predominantly with the service provider. Such asymmetric pay-offs would lead to the co-ordination difficulties just mentioned. For all these reasons, the use of mandated separation remedies has been eschewed.<sup>13</sup>

In an effort to avoid these pitfalls, *functional separation* has come to be seen as an *intermediate* solution which can be effective against instances of non-price discrimination and, at the same time, can limit the disadvantages of more profound forms of corporate break-up. It can itself be ranked in several degrees, ranging from the creation of a wholesale division to legal separation (legally separate entities under the same ownership).

## Access pricing schemes

Against this background, a number of considerations arise for regulators seeking to price regulated access. There are a number of challenges that have been outlined above, of which three stand out:

- (a) how to allocate costs in the presence of economies of scope;
- (b) uncertainty about the extent to which competitive entry can occur; and
- (c) how to address the risk faced by potential investors (in particular how to price the value of delayed investment).

In broad strokes, where there is a degree of certainty about the likely extent of competition and where the prospect of infrastructure-based competition is limited, there is a strong preference for cost-orientated pricing.<sup>14</sup> In effect, the

regulator is accepting that a better form of competition will not occur in the medium term and simply seeks to pass on the costs borne by the network owner.<sup>15</sup> Where there is uncertainty about the extent to which competitive entry might occur, looser forms of pricing are often favoured. One such pricing scheme is the so-called 'retail-minus' pricing model; under such a scheme, the retail charge is the starting point and from this base point the costs of the service elements provided by the entrant are subtracted. In theory, therefore, if the entrant is more efficient than the network owner for those service elements which they supply, they have a competitive advantage and a margin to survive on. For instance, a rebranded service for which an entrant has simply marketed and invoiced the service would have a wholesale price equal to the retail price minus the cost to the incumbent of marketing and billing the service. Under normal circumstances, in order to have a viable chance to compete, an entrant would need to compete over a significant portion of the value chain and be materially more efficient on that portion.

A celebrated use of 'retail-minus' pricing that is pertinent to the discussion that follows concerns the introduction of Local Loop Unbundling (LLU) in Europe and the pricing of broadband access services in response to LLU. In practice, the movement from narrowband dial-up internet access to broadband access in Europe was accompanied by the introduction of LLU in Europe.<sup>16</sup> Under this scheme, entrant operators were allowed to rent the physical copper loop in the existing network: since no one considered that a competitive copper network deployment was likely, such access was priced on a cost-orientated basis. However, in order to take advantage of LLU, an entrant needed to build out its network to the local exchange in order to obtain access to the LLU. The extent to which this was possible in each case was uncertain. The challenge for regulators was that an alternative access product (called 'bitstream' access) existed, with the pricing of bitstream access being a very important consideration in practice as regards the extent of competition that could be based on LLU. Many regulators opted for a 'retail-minus' pricing model for bitstream, which meant that entry was possible on this basis, but LLU would be preferable where it was viable. Over time then, as the limits of LLU economics were being discovered,<sup>17</sup> bitstream pricing gradually moved to a more cost-orientated approach.<sup>18</sup>

at an ideally designed network). In turn, the costs used can be 'historic costs' (what was actually paid) or 'current costs' (what would be paid today). Since traditional telecommunications networks have evolved for over a hundred years, these differences in approach can lead to very large pricing differences.

13 M. Bourreau, W. Maxwell and T. Shortall, 'Cooperation between firms to deploy very high capacity networks', CERRE Report 2020.

14 Cost-orientated pricing in telecommunications can take many forms. The Long Run Incremental Cost (LRIC) standard is often preferred in Europe and variations of this standard allow the inclusion of certain shared or common costs (for example, 'LRIC+'), and this can be based on a 'bottom-up' approach (looking at the world as it is) or on a 'top-down' approach (looking

15 Note that if there are significant economies of scale, these are shared with the access seeker.

16 Regulation (EC) No 2887/2000 of the European Parliament and of the Council of 18 December 2000 on unbundled access to the local loop.

17 LLU also enabled a degree of technological independence, whereby the entrant could develop and deploy new services over its own network, created through the use of rented copper loops.

18 For an overview, see Pio Baake and Brigitte Preissl, 'Local loop unbundling and bitstream access: regulatory practice in Europe and the US, No. 20'. (DIW Berlin: Politikberatung kompakt,



## The NGA and NDCM Recommendations

Already by 2006, the European Commission ('the Commission') had recognised that the transition from copper to fibre networks was the next big challenge facing fixed networks. The Commission wanted to ensure investors in the sector by setting forth its vision of the regulatory regime that would apply to these newly deployed fibre networks, announcing that it would bring forward guidelines on the regulatory treatment of such networks. When first proposed, the priorities laid out in the *NGA Recommendation* were designed to achieve the joint aims of stimulating investment in fibre and the strengthening of broadband competition. The overarching policy ambition underpinning that Recommendation was to reduce the scope for divergence in regulatory approaches across Europe in order to confer legal certainty, noting that divergence could damage competition.<sup>19</sup>

To this end, the Commission brought forward an initial draft of the *NGA Recommendation* in 2008 which was subject to significant amendments until it was finalised in 2010. As noted elsewhere, the process by which the *NGA Recommendation* was produced meant that the initial draft, which was based on the working assumption that infrastructure-based competition was superior and possible, was ultimately superseded by a radically different final version of the *NGA Recommendation* which downplayed the possibility of infrastructure-based competition and instead relied on a services-based model of access competition.<sup>20</sup>

The underlying principle behind the Commission's first draft<sup>21</sup> was that NRAs should provide access to the networks of dominant operators at the lowest possible level in the network. In particular, they should mandate access to the ducts of dominant operators that would allow competitors to roll out their own fibre networks. NRAs were permitted to impose further physical access obligations (access to unlit fibre) beyond access to ducts where ducts were not available or where the population density was deemed to be too low to sustain a viable business model. Access to active network elements, such as bitstream, would be maintained in those situations where lower-level remedies did not sufficiently address distortions of competition but would otherwise be withdrawn. There was a significant concern that virtual access products such as bitstream over fibre networks would undermine investment incentives if conditions were too lax, in an echo of concerns voiced in the US.<sup>22</sup> This represented a radical departure from the existing Commission practice of cost-orientated access to existing networks (implying that, while entrant operators could continue to rely on access,

the conditions of access would not guarantee that the access seeker would advance up the 'ladder of investment' in the manner originally envisaged).

However, when the Commission's final *NGA Recommendation* was ultimately adopted, the Commission reversed course and clung to its traditional policy. Thus, the final version of the *NGA Recommendation*<sup>23</sup> did not put forward a different access model from that which existed for copper networks. In effect, this meant that the ladder of investment approach<sup>24</sup> was migrated into the NGA context despite the competitive dynamic which characterised fibre rollout being fundamentally different from its copper counterpart.

It is critical to understand that the outcome of this twin-track policy process was the creation of natural experiment, with certain EU Member States following the policy orientation in the first version of the *NGA Recommendation*, based on a vision of infrastructure-based competition. This could be compared to a much more incremental approach that relied on the identification of precision pricing points to hit a goldilocks access price (high enough to encourage investment by incumbent operators but not so high as to snuff out competition that was based on the access products).

The results of this natural experiment were radically different in different Member States, and proved impossible for policymakers to ignore when they again turned to revise the regulatory framework. On the one hand, those countries that followed<sup>25</sup> the first version of the *NGA Recommendation*, such as Spain and Portugal, followed a policy advocated which could be characterised as the promotion of infrastructure based competition.<sup>26</sup> This approach was supposed to be designed to stimulate investment by facilitating broadband deployment (through access to infrastructure) and by signalling the removal of other access products over time (that is, conveying the message of 'build your own or risk being left behind'). On the other hand, those Member States which followed the final version of the *NGA Recommendation*, such as the UK and Germany, adopted a policy stance which can conveniently be described as an 'upgrading of copper networks' approach.

With the passage of time, it could be seen that both approaches largely met the objective of making high speed broadband available, but only insofar as ambitions were set at levels that were not too high. A copper upgrade to VDSL<sup>27</sup> could be accomplished quickly and required little additional investment, but it always risked falling short of its aspirations

2006).

19 <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/08/1370>.

20 For a full description, see Martin Cave and Tony Shortall, 'The extended gestation and birth of the European Commission's Recommendation on the regulation of fibre networks', *info* 13(5) (2011), 3–18.

21 [http://ec.europa.eu/information\\_society/policy/ecomm/library/public\\_consult/nga/index\\_en.htm](http://ec.europa.eu/information_society/policy/ecomm/library/public_consult/nga/index_en.htm).

22 For a summary of these issues see Y. Benkler, R. Faris, U. Gasser, L. Miyakawa and S. Schultze, *Next Generation Connectivity: A Review of Broadband Internet Transitions and Policy from Around the World* (2010 report). Berkman Center for Internet and Society at Harvard University.

23 2010/572/EU: Commission Recommendation of 20 September 2010 on regulated access to Next Generation Access Networks (NGA).

24 M. Cave, 'Encouraging infrastructure competition via the ladder of investment', *Telecommunications Policy* 30(3-4) (2006) 223–237.

25 In fact, Portugal had already embarked upon this path and did much to inspire the first version of the *NGA Recommendation*.

26 Whereby it was made clear that short-term support for access seekers to incumbent networks would be removed over time while access to passive infrastructure for the purpose of network deployment would be facilitated and improved.

27 Very high speed Digital Subscriber Line (VDSL) was the successor to ADSL and required deployment of active equipment closer to the user, at the street cabinet in a typical topography, and fibre backhaul from that street cabinet, and was thus often referred to as FTTC (Fibre To The Cabinet). It was superseded by VDSL2.

on the basis of future network requirements. As the broadband targets being set continued to evolve, it soon became clear that policymakers would be best advised to ensure the development of FTTH/B networks. This required them to be much more explicit about the fulfilment of that desire and required them to introduce measures to drive the market to achieve those outcomes.<sup>28</sup>

A second and perhaps more significant choice for policymakers thrown up by this natural experiment concerned the different forms of competition that evolved in FTTH/B and VDSL-based markets. In markets with infrastructure-based competition, entrants proved adept at raising funds and deploying networks and needed little or no ongoing support. By contrast, in service-based competition markets on the other hand, it became increasingly clear that while an access-based competitor could exist on upgraded copper, it was completely dependent on the regulator granting that access (bitstream or upgraded bitstream products such as 'VULA')<sup>29</sup> and on the financial terms associated with such access, which determined the extent to which entrants could grow and thrive, or even continue to exist.

Hence, over time, detailed guidance came to be required by European National Regulatory Authorities to guide their pricing decisions. This took the form of the *NDCM Recommendation*.<sup>30</sup> Implicit in both the final versions of the *NGA Recommendation* and the *NDCM Recommendation* was a view that the prospect for infrastructure-based competition was very limited in practice. Therefore, the *NGA Recommendation* recommended a full suite of access products available over NGA networks at all times, while the *NDCM Recommendation* advocated a strict cost-based approach for access (with various opt-outs for high-volume deals or to compensate for additional risk being taken). Although it might now seem self-evident, it was not obvious that infrastructure-based competition would be successful to the extent that it was at the time both of these Recommendations were under consideration. That lack of belief that infrastructure-based competition would actually succeed is best exemplified in the Commission's reaction to the Spanish National Regulatory Authority's proposal to pursue such an approach in 2009. In its comments on that proposed Decision,<sup>31</sup> the Commission commented as follows:

In this regard, the Commission draws attention to the fact that the prospects for enhanced infrastructure-based competition do not appear to be particularly strong in

Spain. First, as indicated by the Commission in its response to the CMT's notification of the wholesale physical infrastructure market, there is yet neither a reference offer nor a price obligation for access to the physical network infrastructure in place. Secondly, even if access to the physical infrastructure of TESAU [Telefónica de España] would turn out to be an effective remedy, it may take considerable time for operators to roll-out their own networks. Thirdly, alternative operators have still a weak position in the Spanish retail broadband market. Against this background, and in particular as it is not foreseeable that entrants could match the large-scale fibre deployment plans of Telefónica in the near future, there is a risk that, with a fibre-based wholesale broadband access product which is limited in speed, Telefónica could pre-empt the market for retail broadband services during the period in which the deployment of fibre is taking up in Spain. Therefore, and in view of already present indications of a trend towards higher speeds, the Commission is compelled to maintain its concerns regarding the risk that the competitive process in Spain will be hindered due to the lack of a bitstream offer above 30Mb/s.<sup>32</sup>

However, despite the serious reservations about the prospects for infrastructure-based competition, in those Member States seeking to achieve FTTH investments based on such competition, alternative operators had achieved a level of independence through their investments in densely populated areas, and could survive without sector-specific regulatory oversight for the most part so long as certain very basic access conditions remained in place (such as mandated access to ducts and in-building wiring). This permitted some respite from an environment in which asymmetric access regulation prevailed with permanently defined groups of 'access providers' and 'access seekers', each with diametrically opposed interests as to price and other terms and conditions of access. Over time, technology changes in copper networks (for example, vectoring)<sup>33</sup> led to the realisation that evolutions of VDSL technology were exacerbating many restrictive aspects of access, by pushing entrants further and further down the value chain (and away from their consumers). This meant that the prospect for 'evolution' over copper wires was being reversed, while at the same time it was becoming clear that infrastructure-based competition was driving investment much faster than the Commission's preferred highly regulated approach.

As can be seen in Figure 1 below, the failure of the Commission's approach set out in the *NGA* and *NDCM Recommendations* (based on the mistaken premise surrounding the prospects for infrastructure-based competition) and the success of an alternative approach was already apparent by the time the Commission was drafting the next generation of its telecommunications regulatory framework in 2015. The evolution of the Commission's thinking is set out clearly

28 See T. Shortall and M. Cave, 2015, 'Is symmetric access regulation a policy choice? Evidence from the deployment of NGA in Europe', *Communications & Strategies* 98, p.17.

29 Virtual Unbundled Local Access or VULA, was the name given to bitstream access over VDSL connections – it was a way of masking the frequent unavailability of an Unbundled Local Loop, either for technical or economic reasons in VDSL networks.

30 2013/466/EU: Commission Recommendation of 11 September 2013 on consistent non-discrimination obligations and costing methodologies to promote competition

31 In fact, the Commission sought to veto the proposal but could not do so, since the critical issue concerned the remedies that applied – an area where the Commission had limited authority. The approach by Spain's CMT led to the Commission seeking veto powers in relation to remedies (in addition to its more traditional powers to veto issues relating to questions of market definition and market analysis).

32 Case ES/2008/805: Wholesale Broadband Access ('WBA') in Spain – Withdrawal of serious doubts and comments pursuant to Article 7(3) of Directive 2002/21/EC1, 26-12-2008.

33 Vectoring is a technique to increase the speed of a given VDSL2 line by using noise-cancelling technology to reduce interference from adjacent lines or other services or plant. It effectively meant that only one operator could operate at a given street cabinet given the technical and frequency coordination limitations.

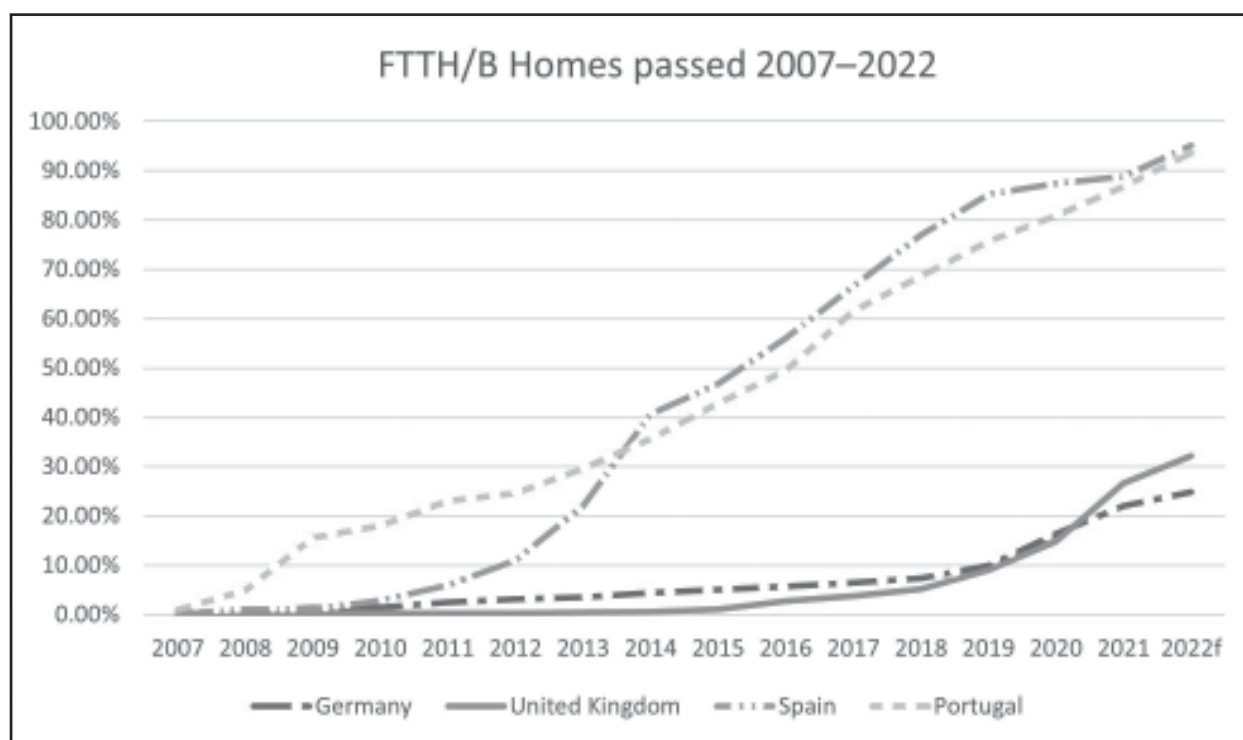


Figure 1. FTTH/B Homes passed 2007–2022<sup>34</sup>

in the impact assessment report<sup>35</sup> which accompanied the revised EECC.<sup>36</sup> On 4 December 2018, European legislators approved a new EU regulatory framework for the telecommunications sector set out in the EECC. That legislation, which came into full effect across the EU Member States by late December 2020, codified in one single document all the disparate elements of law which makes up the EU Regulatory Framework for electronic communications and significantly reset the approach adopted towards the regulation of NGA (now VHCN).

## The impact of the European Electronic Communications Code (EECC)

### Technological neutrality downgraded/focus on investment

The promotion of connectivity, access to, and the take-up of VHCN was introduced into the EECC as a new policy objective of the electronic communications regulatory framework. This new policy objective was to sit alongside three traditional policy priorities introduced in the 2002 regulatory framework, namely: the promotion of competition; the development of the internal market; and the promotion of the interests of the citizens of the EU.

The new policy goal is reflected in the unambiguous language of Article 3(2)(a) of the EECCs, which sets out this new policy objective as the need to ‘promote connectivity and access to, and take-up of, very high capacity

networks, including fixed, mobile and wireless networks, by all Union citizens and businesses’. A very important change was also made in Article 3 regarding the interpretation of the key concept of ‘technological neutrality’. Whereas under the 2002 regulatory framework the concept of technological neutrality was a cornerstone of regulatory policy, the concept became heavily qualified under the EECC. Thus, the new Article 3(4)(c) EECC requires policymakers to ‘apply Union law in a technologically neutral fashion, *to the extent that this is consistent with the achievement of the objectives set out in paragraph 2*’ (emphasis added). Those objectives include the objective of promoting connectivity and access to, and take-up of, very high capacity networks (VHCNs).

Elsewhere in the EECC, the definition of a VHCN is prescribed to be fibre to the home, fibre to the building, fibre to the antennae as the baseline performance of VHCN. The actual definition is set out in Article 2(2) in the following terms:

... ‘very high capacity network’ means either an electronic communications network which consists wholly of optical fibre elements at least up to the distribution point at the serving location, or an electronic communications network which is capable of delivering, under usual peak-time conditions, similar network performance in terms of available downlink and uplink bandwidth, resilience, error-related parameters, and latency and its variation; network performance can be considered similar regardless of whether the end-user experience varies due to the inherently different characteristics of the medium by which the network ultimately connects with the network termination point.

The use of this language has meant that, as from its original proposal for the EECC in 2016 until its ultimate conclusion, the Commission has been signalling its intent to make

<sup>34</sup> IDATE data for FTTH Council Europe.

<sup>35</sup> SWD(2016) 303 final.

<sup>36</sup> Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code.



investment in FTTH/B a top policy priority. In addition, the EECC also contains two key provisions which seek to render telecommunications networks attractive to a new class of investors who have the capacity to bring in new sources of finance to invest in VHCN networks, namely, long-term investors (such as insurance funds). This class investor looks towards long-term (30+ years), low-risk investment products (not technology-dependent, limited prospects of competitive disruption) and, in return, is willing to accept a lower cost of capital.<sup>37</sup> Traditional network investments by integrated telecom firms were historically classified as technology investments, which meant that short-term payback periods and high rates of return were required. However, when the investment focuses on the network and avoids the provision of retail services, the investment can be reclassified in financial terms as an infrastructure investment.

The success of this approach was already visible in Stokab, a wholesale-only fibre provider in Sweden and Reggefibre in the Netherlands.<sup>38</sup> This allowed a new source of funding to enter telecommunications markets which was more than capable of meeting the capital requirements of the sector. In practical terms, the EECC sets out two major sets of provisions to encourage that new class of telecommunications operator that would be structured so as to appeal to this new class of investor.

#### (i) *The rise of 'wholesale-only' operators*

Wholesale-only operators are defined under Article 80 of the EECC and enjoy a large number of regulatory exemptions that provide long-term investors with certainty for at least the next 10 to 15 years. Even where such entrants eventually become economically dominant (or SMP) in their own right, in the provision of wholesale services, they would continue to be exempt from most forms of economic regulation.

#### (ii) *Co-investment*

Article 76 EECC facilitates the other main instrument that seeks to drive investments: co-investment. Under this provision, even dominant network operators that invest under certain conditions can enjoy a series of regulatory exemptions. That provision is accompanied by a separate commitments procedure which includes a market test and protections for entrants relying on old and newly built infrastructures. The investment impact of this swathe of regulatory exemptions is clear. As can be seen in Figure 1, once the Commission's proposals were published, there was a modest change in the UK and German investment patterns. However, once the terms of the EECC had been agreed, it is clear that investment in VHCN began to accelerate.

To a significant degree, it can be considered that the Commission's concerns about separation were overcome by (a) the disintermediation of services and networks<sup>39</sup> and (b) by the capacity of separation to crowd-in long term investors.

### **Sources of funding/investment trends**

The change in investment signals, particularly with the adoption of the EECC, has been met in the marketplace with a significant shift in the sources of funding for network investments as well as those deploying the funds. While traditional fixed incumbents enjoyed a particularly favourable starting position in the race for VHCN deployment, the temptation for them to simply opt for very cheap copper upgrades cannot be understated, given that service delivery could continue unimpeded with a minimal increase in capital expenditure. The main risk was strategic, with the possibility that a certain share of their customers would be lost to competitors investing in fibre networks; as long as current demand could be met, most incumbent operators concluded that such losses would not necessarily be large.

The broad expectation in European markets was that, over time, large European incumbents would eventually rouse from their slumber and invest at pace, if only to meet that strategic threat. As can be seen in Figure 2 below, in the early stages of VHCN roll-out in Europe, incumbent operators accounted for a small percentage of fibre access lines with slightly more than 20 per cent of total penetration. However, as can also be seen in Figure 2, the total number of lines was small. As the total number of lines has grown from 16 million to approximately 40 million by 2013, the incumbent's share of lines grew to almost 40 per cent. In 2016, just as the text of the EECC was being proposed to European legislators, the EU had 95 million VHCN access lines, with 42.6 per cent of these access lines belonging to incumbent investors.

However, in large part due to the provisions of the EECC, which have encouraged the emergence of 'wholesale-only' operators, as well as the take-up of various forms of co-investment, the rate of investment by a range of competing operators has accelerated more quickly than those of incumbent operators. This step-change in investment patterns is reflected in the fact that by 2021, with 270 million VHCN access lines deployed across the EU, the share of incumbent lines stood at 36 per cent, with local municipalities holding a 5 per cent share and competing operators accounting for a 59 per cent share, or 160 million of those access lines.<sup>40</sup> Based on current projections, traditional fixed incumbent operators will soon own *less than one-third* of all telecom VHCN access lines. These figures support the view that the focus of the EECC to persuade long-term investors to invest in telecommunications markets has already had a dramatic impact, which is expected to continue for a number years to come.

37 Historically, typical investments for such long-term investors involved road, rail or energy projects.

38 As noted in the impact assessment accompanying the EECC, case studies from SMART 2015/0002 suggest that 'structural separation/wholesale only models can support the business case for fibre by aggregating demand from several service providers. This strategy has been adopted in particular by regional and municipal investors such as Stokab and Reggefibre to support a fibre business case'.

39 Whereby services were no longer specific to the network but could be delivered over-the-top via the TCP/IP protocols.

40 Note that although there are 270 million access lines, only 120 million homes have been passed with VHCN due to the fact that there are often multiple lines per dwelling, particularly in densely populated urban centres.

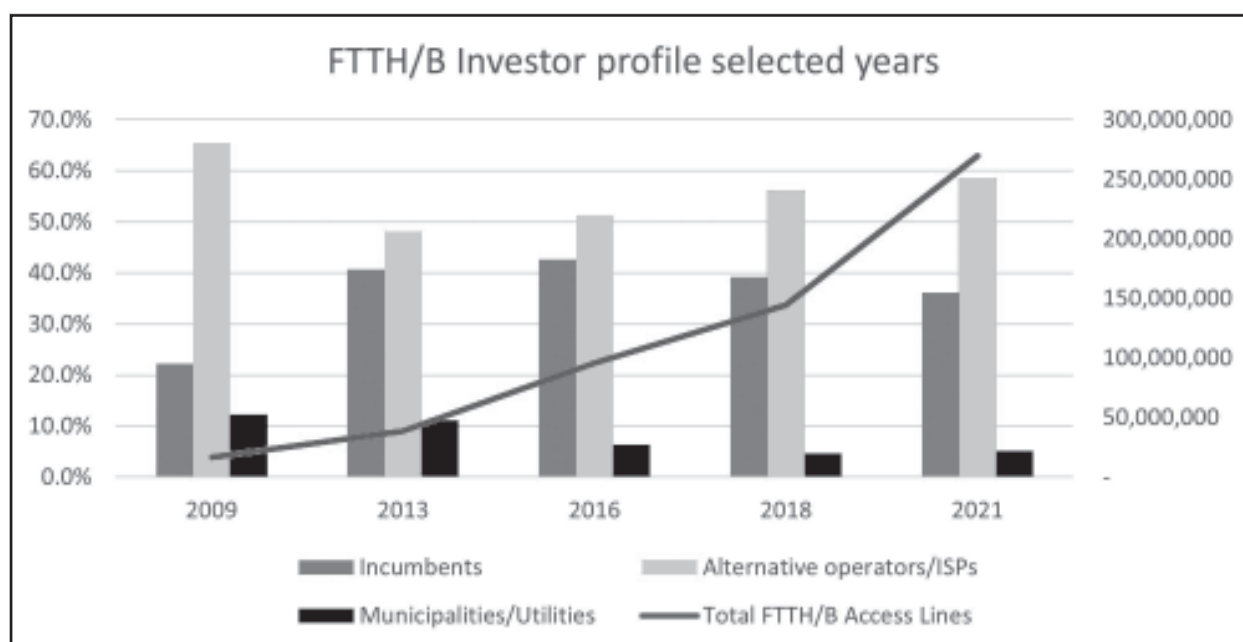


Figure 2. EU 27+1 FTTH/B Investor profile in selected years<sup>41</sup>

### The impact of the BCRD

Given the success observable in certain Member States (see discussion above) that infrastructure-based competition was the main driver for fibre deployment, it was not unexpected that the EECC would endorse such an approach. While infrastructure competition worked as a driver of investment in those Member States where it was actively encouraged, those countries often had extensive civil engineering infrastructures that could be readily shared, thereby lowering the cost of deployment significantly.

To succeed in other Member States, this alternative model of infrastructure-based competition required the optimum level of regulatory impetus in order to lower deployment costs. This impetus came in the form of the Broadband Cost Reduction Directive (BCRD),<sup>42</sup> whose focus was on obliging Member States (rather than directly encouraging investors) to facilitate access to passive infrastructure that could be utilised by all market players. The planned revision of the BCRD over the course of 2022 will arguably provide a critical complementary state-led component to the positive private investment message set forth in the EECC (see below).

The policy thrust behind the BCRD can also support the EECC's key objective of getting VHCN networks widely and quickly deployed by the granting of access to existing civil engineering works and other measures to lower cost and speed up deployment.<sup>43</sup> However, the BCRD will need to be implemented more effectively than it has been in the

past if the logic of the EECC is to be coherent with a logic that requires competitive builds where it is cost effective. An effectively implemented BCRD could make large parts of Member States cost effective for competitive network build-out. Given that wholesale-only operators enjoy an effective exemption from having to share any civil infrastructure that they own or have control of, both under the BCRD itself and the EECC, the incentives are self-evident for operators investors either to take the less risky infrastructure sharing route to market or to opt for the riskier but more lucrative self-build option and focus on wholesale-only provision.

Very few NRAs currently impose access obligations on operators by mandating access on SMP-designated operators to civil engineering through the market analysis procedure available under the EECC; this is generally achieved through the workings of the BCRD. However, there is very little discussion on price differentiation in the BCRD context, depending on whether civil engineering infrastructure is a legacy infrastructure or a new-build. While the BCRD plays an important role in ensuring that legacy infrastructures are not over-compensated, it is also important that there is a sufficient incentive to build new facilities. Thus, how costs are recovered in each instance will be important to ensure that the right balance is struck between incentivising new investments and ensuring low-cost duct access to lower the overall cost of deployment. The shortcomings of the current BCRD in this respect are arguably being redressed by the investment incentives being pursued in the EECC.

Finally, in the absence of allocating a single body with overall responsibility for implementation of the BCRD (it is commonplace for responsibilities to be shared among a range of bodies in many Member States), effective and timely implementation has been problematic in the past. A single repository of information both of existing, ongoing and planned activities would greatly assist operators to understand the opportunities available for network sharing. The coordination of civil works for the deployment of

41 Data prepared by IDATE for FTTH Council Europe.

42 The Broadband Cost Reduction Directive (BCRD) Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks.

43 Co-ordinating future deployments (Article 5) and giving notice (Article 6), permit granting (Article 7) and in-building wiring and access (Articles 8 and 9) can all potentially lower cost and speed up deployment.



electronic communications is a matter which in practice has often proved to be inefficiently administered, as different kinds of operators require different amounts of time to obtain the relevant authorisations and to coordinate their actions. This has often slowed down their roll-out operations. Therefore, the coordination of civil works without a harmonisation of the process of issuing permits and without assigning overall responsibility to a single body for coordination and implementation purposes has undermined the full effectiveness of the BCRD.

### Investment support through indirect means

The establishment of a clear overriding policy objective (the promotion of VHCNs), along with the creation of various ‘light touch’ deregulation incentives for network operators and investors (wholesale-only, co-investment, longer market review periods stretching from three to five years) have been effective in their own right, but have also been supported by a series of other measures in the EECC aimed at facilitating speedy network deployment, including:

- Article 22 – the use of geographic surveys;
- Articles 44 and 45 – the provision of rights of way and co-location rights for operators; and
- Article 72 – an SMP-related obligation requiring the provision of civil engineering support. These measures collectively facilitate new network deployment and narrow (in geographic terms) the focus of regulatory intervention and support.

These additional measures often overlap with those in the BCRD which, as outlined above, has sought to lower the costs of network deployment. The likely revisions to the BCRD that will be proposed over the course of 2022 will no doubt build further upon what has already been achieved under BCRD. Given the recent positive disposition of investors in response to the incentives provided under the EECC, an escalation in the relative importance and application of the terms of the BCRD by Member States is inevitable.

### Projections for the future

To a large extent, the shape of the future BCRD (now being referred to as the ‘Connectivity Act’) can be seen by reference to the Commission’s recently introduced connectivity package,<sup>44</sup> previously published as part of the Commission’s overall response to the Covid-19 crisis<sup>45</sup> and which seeks to accelerate both VHCN and 5G network investments through the application of various measures brought forward from the BCRD and the future 5G/6G Action Plan which highlight the perceived urgency of the need to take action. This latest series of measures also includes revisions to the *NGA Recommendation* and the *NDCM Recommendation*. The importance of the deployment and take-up of VHCNs is central to the development of a

coherent EU policy that is fit for the digital age and which constitutes a central pillar of the Von der Leyen Commission’s policy priorities. The Commission’s ambitious connectivity targets in its Gigabit Communication of 2016<sup>46</sup> highlight the importance of the deployment and take-up of VHCN under the guise of a policy orientation designed to achieve ‘a European Union fit for the digital age’.

The Commission’s approach therefore adopts three crucial elements to ensure that fibre networks are as widely deployed as possible:

- (1) the pursuit of a clear policy goal to promote VHCNs (with a VHCN being understood to be a FT\*TH/B network architecture for traditional fixed telecommunications operators or its equivalent);<sup>47</sup>
- (2) the facilitation of roll-out of networks to the greatest extent possible (with the BCRD is seeking to lower the cost of deployment, speed up the availability of permits, etc.); and
- (3) the creation of incentives to invest, with these incentives being realised over time (this is illustrated by the guarantees of a loosening of regulatory obligations over time (for example, Article 80, Article 76 EECC together with the associated commitments procedure set out in Article 79) and the dilution in impact of alternative means of access.

However, as can be seen in Figures 1 and 2 above, the current policy position appears to be realising its goals. Current forecasts suggest that coverage in the EU will reach approximately 200 million homes passed by 2027 or 89 per cent coverage by that date. There is no reason why ubiquitous coverage cannot be achieved by 2030 or shortly after. In fact, the most significant challenges to the meeting of such targets are posed by those Member States such as Germany that started their investment journey later than investment pioneers such as Spain and Portugal. If one could exclude Germany, the share of EU homes passed by fixed VHCN would rise to 94 per cent by 2027. Figure 3 (Overleaf) shows the anticipated future progress for FT\*TH/B deployment<sup>48</sup> and serves to highlight the overall success of the EECC in quickly driving investment (and the form of investment in VHCN). As can be seen in Figure 3, rapid progress is possible and it can be expected that by 2030, the Gigabit Society goals set forth by the Commission will be largely realised based on current investment plans.

### Risks to the current investment trajectory

As we have seen up to this point, the *NGA* and *NDCM Recommendations* were based on a previous policy perspective which did not consider that the prospects for infrastructure-based competition over fibre networks could realistically

44 [https://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=69383](https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=69383).

45 [https://ec.europa.eu/commission/presscorner/detail/en/ip\\_20\\_940](https://ec.europa.eu/commission/presscorner/detail/en/ip_20_940).

46 Communication from the Commission of 14 September 2016, Connectivity for a Competitive Digital Single Market – ‘Towards a European Gigabit Society’, COM(2016) 587.

47 As defined by BEREC 2020 ‘Guidelines on Very High Capacity Networks’, BoR (20) 165.

48 Note that future progress is based on a survey of operators’ deployment plans, rather than reflecting an extrapolation from existing trends (that is, what does your five-year investment plan look like?).

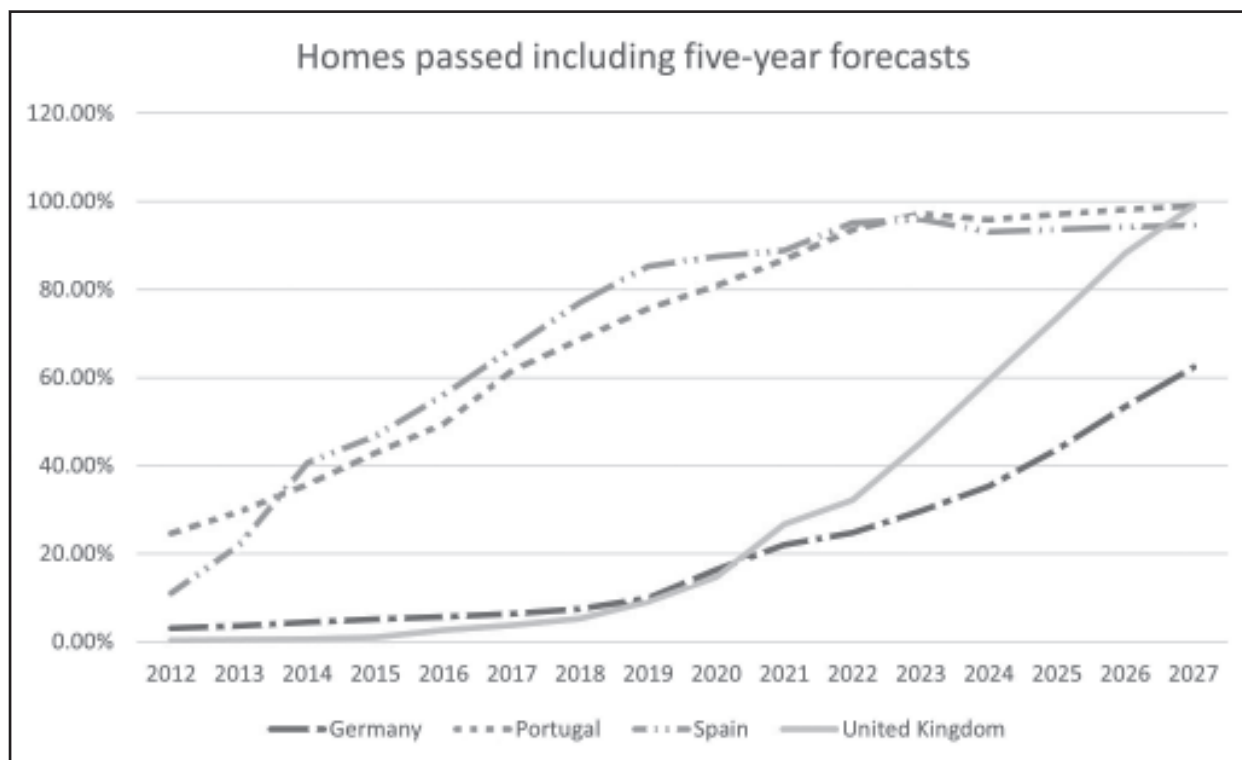


Figure 3. FTTH/B Homes passed forecasts up to 2027<sup>49</sup>

be realised. That policy consistently adhered to the view that network access pricing was the best means by which to entice investment which would otherwise be assumed to be made only by incumbent operators.

The empirical evidence that has emerged across Europe illustrates the success of inter-network (infrastructure-based) competition rather than intra-network (service-based) competition in driving investment decisions. Indeed, that evidence also suggests that a strict adherence to the dictates of the *NGA* and *NDCM Recommendations* has led to poorer network investment outcomes.<sup>50</sup>

There appears to be an inherent tension between regulated access to existing networks based on cost-orientated pricing and/or margin squeeze tests and competitive infrastructure entry, on the one hand, and on incentives to invest in networks, on the other. Where strict, cost-orientated pricing is applied, the incentive to make large capital expenditures tends to be undermined. Indeed, in such an environment, investors often have an incentive to delay investment to see how technology evolves, or to simply let scale and time reduce equipment pricing, and so on.

Even at this stage of the market's development, it is not clear what the precise scope for competitive entry into VHCNs is or will be. If access remedies are maintained on existing networks, under the prevailing cost-orientation regimes, there may be a danger that very detailed and precise costing methods will scare away investment, and a self-fulfilling prophecy materialises in which only intra-network competition takes place outside urban areas.

As noted already, when bitstream access products were first priced in Europe, a retail-minus pricing scheme was generally used. Policymakers were afraid that if detailed pricing methodologies were used for this relatively simple means of access, the incentive to build out to local exchanges and to utilise LLU would be undermined. Over time, when the scope of LLU investment was clarified, the access pricing regimes were refined. There is now a new transitional phase taking place where significant new entry, based on end-to-end network competition, is emerging. The final extent and strength of that potential competition is as yet unknown. The concern is that if detailed pricing schemes developed in one particular context (copper) are applied to another (fibre), such a pricing formula could restrict the scope of entry and impair future competitive dynamics. If access must be implemented on any VHCN access network, such access should be priced in such a way that there remains a clear incentive to invest in alternative VHCN networks.

At this stage of market development, the use of precise pricing regimes might no longer be appropriate if the public policy imperative is to drive network investment. To be consistent with the current policy, access pricing schemes should have as their *primary* objective the preservation of incentives to invest.

The new *Access Recommendation* cannot therefore be little more than a reaffirmation of the principles contained in the respective *NGA* and *NDCM Recommendations* (which promoted intra-network competition based on precision access pricing).<sup>51</sup> Such an approach would risk undermining the clear policy direction of the EECC, which not only promotes VHCN but also encourages network separation

49 Forecasts prepared by IDATE for FTTH Council Europe: <https://www.ftthcouncil.eu/knowledge-centre/all-publications-and-assets/246/ftth-forecast-for-europe-market-forecasts-2021-2026>.

50 Martin Cave and Tony Shortall (2016) 'How incumbents can shape technological choice and market structure – the case of fixed broadband in Europe', *info*, Vol. 18.

51 The difficulty in revising existing advice is reflected in the draft revised *Broadband State Aid Guidelines* issued by DG Competition in November 2021, which continues to allow the investment of public finance in 30 Mbps download-capacity networks.

as a means to crowd in new sources of finance. If the principles set out in the *NGA* and *NDCM Recommendations* are confirmed (even with refinements), this might suggest to potential investors that they do not need to invest because cost-based access that shares the advantages of the incumbent's economies of scale with its competitors will be available to them even when investments are not being made by them. Significant changes to the investment environment should take place slowly and be flagged well in advance of their implementation, as there also needs to be due recognition given to the fact that the sectoral investors today are very different to the traditional large-scale investors prevalent up to a decade ago, with traditional fixed incumbent operators expected to account for less than one-third of European access lines in the near future.

## Conclusions

The empirical evidence supports the view that the Commission is to be admired for implicitly conceding that a policy for driving investment based on the mandating of precise access conditions to existing networks was failing, and pivoting to a new policy stance that is succeeding in driving VHCN investments. The current policy is based on a three-pronged approach that: (a) sets a clear objective of

promoting VHCNs; (b) facilitates investment by taking practical measures to lower deployment costs; and (c) creates the incentives to invest and to draw in new investors, notably long-term European investors such as insurance funds.

The policy rethink is already a big success and forecasts suggest, based on existing investment plans, that the EU in general is on track to hit its connectivity targets, even if certain Member States are still proverbial laggards. The supporting policy instruments to the EECC are in the process of being revised, with the soon-to-be-released upgraded BCRD having the capacity to accelerate investment so that VHCN coverage can reach into the more challenging geographic areas of the EU.

However, there are also risks that need to be borne in mind by policymakers. The *NGA* and *NDCM Recommendations* which encompassed the previous policy to drive network investments are also due to be revised. Should that revision process not be in keeping with other pro-investment policies, there is a real risk that the revision process may send the wrong signals to the market and undermine the investment incentives that are currently perceived to exist under the EECC and other 'flanking' policies. The consequences of any policy changes on the current investment trajectory should therefore be carefully weighted before such changes are implemented.