



Creating a brighter future

Response to the consultation on the 'Fragen der Entgeltregulierung bei FttH/B-basierten Vorleistungsprodukten mit Blick auf den Ausbau hochleistungsfähiger Glasfaserinfrastrukturen'

26 April 2017

INTRODUCTION

The FTTH Council welcomes the opportunity to reply to this consultation, 'Fragen der Entgeltregulierung bei FttH/B-basierten Vorleistungsprodukten mit Blick auf den Ausbau hochleistungsfähiger Glasfaserinfrastrukturen' from Bundesnetzagentur.

The FTTH Council Europe is an industry organisation with a mission to accelerate the availability of fibre-based, ultra-high-speed access networks to consumers and businesses. The Council promotes this technology because it will deliver a flow of new services that enhances the quality of life, contributes to a better environment and increased competitiveness. The FTTH Council Europe consists of more than 150 member companies. Its members include leading telecommunications companies and many world leaders in the telecommunications industry (additional information is available at www.ftthcouncil.eu).

Regulation, existing and signalled, has a profound impact on the market operations. Credible, predictable and stable policies create a framework in which capital can make strategic choices over the long term. BNETZA is absolutely correct to express concern to have market regulation which is stable, transparent and signalled well in advance because of the uncertainty its absence can create in a context where returns may take 20 years to be realised.

A wealth of academic work has shown that the benefits of end-to-end infrastructure based competition far outweigh these of service based competition in the long run¹. However, in recent years fixed investments by DT were mostly directed towards upgrading its copper network, instead of large FTTH investments like we have seen in some other EU Member States. The competitive fringe remains strong in Germany and as the largest European market, the potential for large scale FTTH entry is strong and this can deliver strong competition for Germany and strong benefits for consumers.

However, investments in FTTH network roll-out by third party access seekers only takes place when virtual access is less attractive than the option to build. In other words, virtual access regulation does not stimulate network investments, while physical access measures, such as access to ducts and in-building wiring, will, if well considered and designed. While option pricing remains a possibility, it has not yet been achieved with success – bright line rules about the form of access are far more effective as seen in other European markets.

The FTTH Council believes that Bundesnetzagentur should be explicit about the need to geographically segment the market and that this is preferable to an alternative approach

¹ See for example, Grajek, Michał, and Lars-Hendrik Röller. "Regulation and investment in network industries: Evidence from European telecoms." *Journal of Law and Economics* 55.1 (2012): 189-216., Cave, Martin. "The ladder of investment in Europe, in retrospect and prospect." *Telecommunications Policy* 38.8 (2014): 674-683., Bourreau, Marc, and Pinar Doğan. "Service-based vs. facility-based competition in local access networks." *Information Economics and Policy* 16.2 (2004): 287-306. Röller, Lars-Hendrik, and Leonard Waverman. "Telecommunications infrastructure and economic development: A simultaneous approach." *American economic review* (2001): 909-923.

which would be to apply different remedies in different parts of a national market. The conditions of competition have been markedly different within certain Member States that have found a national market but put different remedies in different geographic parts of that market .

In whatever way it is achieved, either by geographically segmenting the market or varying remedies within a national market, the FTTH Council believes regulators must focus their interventions where they can have maximum impact with a set of remedies in those areas where effective competition in market 3a is potentially possible and complimented with another set of remedies where effective competition in market 3a might not be possible.

The Council recognises that there are likely to be large differences in the possibility for network competition in Germany between densely populated urban centres, sparsely populated rural areas and the areas in-between. The FTTH Council also believes that there can be competing networks (either duplicated fully or partly) in urban centres, that there may be no FTTH network in rural areas without public support and that there may be very limited competition on fibre networks in-between.

In the medium term, the experience from other countries in Europe suggests that the essential components to stimulate infrastructure based competition are twofold (a.) The first set of measures are principally about creating the incentives to invest, often this is the most difficult part but requires the gradual removal of virtual access remedies in order to stimulate infrastructure investment. (b.) The second set of measures are about efficiency and lowering barriers to entry (e.g. measures such as co-ordination of in-building wiring, accelerated permit granting and so on).

The FTTH Council believes that there is enough evidence to suggest a combination of appropriate enabling measures and clear regulation can drive private investment in densely populated areas while State Aid, together with appropriate access obligations can ensure full coverage of these networks.

THE COMPETITIVE LANDSCAPE

As broadband markets evolved, regulators across had to choose between the different forms of access granted to third party service providers that wanted to compete and had to decide where emphasis ought to be put. At the early stage of market liberalisation, a number of countries in Europe including Belgium, the UK, Ireland and Spain believed that the best way to bring competition into the market quickly was through the use of “*virtual access remedies*” – such as bitstream – rather than to rely on physical access- Local Loop Unbundling.

There were a number of reasons for this. Virtual access remedies allowed easy and rapid entry and enabled, at least in theory, a later progression to a deeper form of access along the so called “*ladder of investment*”. Thereby, a customer base could be built on the easily (and cheaply) obtained virtual remedies and then, armed with this customer base, the investments

in LLU could be undertaken as the entrant had gotten a head start in the market². However, with the benefit of hindsight it became clear to regulators that LLU attracted much stronger and more committed competitors even if the associated risks were higher: the investment needed is higher, mostly sunk and the process is more difficult. Hence Europe saw significant policy changes coming from a number of EU Member States with heavy promotion of LLU through price reductions from 2005/2006. This had a dramatic impact on the take up of LLU.

Across Europe a number of things happened in the market which impacted the performance of competitors accessing European Incumbent's networks but principal among these was that incumbent operators extensively deployed vDSL. and this technological and commercial evolution reduced the area of viable LLU, even under optimum regulatory practice³. As a result entrant operators began to rely more on bitstream (including VULA) access products. The situation for third party access seekers in Europe has continued to weaken in recent years and the same trends are manifest in the German Market as evidenced by the furore over the proposed regulation in Germany of the so called 'near shore lines' where the deployment on vectoring on vDSL at local exchanges risks resulting in a monopoly supply of access (whether by DT or Altnets) wherever cable or alternative FTTH networks are not available.

Current European fixed access regulation

Telecoms regulation in Europe was introduced to enable the transition to a healthy competitive environment and has relied heavily on the historic incumbent operator providing its competitors with access to its own copper local loop normally in the form of LLU and later SLU with the evolution of access technologies. With the move to NGA networks the dynamic and viability of this approach is severely challenged both for technical and economic reasons.

European Regulators have adopted different approaches to regulation over the last 10 years or so with one group of NRAs emphasising infrastructure based competition while others relied on new, virtualised access mechanisms.

The two approaches differ significantly in the form of competition and the level of investment that has evolved since then. The access-based competition observable on upgraded copper is completely dependent on the regulator granting a form of (usually) upgraded bitstream access and on the financial terms of such access. In FTTH countries, meaning where incumbent operators have invested heavily in FTTH networks, by contrast, alternative operators have also achieved a significant degree of independence through their investments, thereby laying the basis either for further deregulation or much lighter touch intervention in

² Cave, Martin. "Encouraging infrastructure competition via the ladder of investment." Telecommunications Policy 30.3 (2006): 223-237.

³ Unbundling local loops at an exchange means that large number of lines are available to entrants at each exchange they build out to and potentially going over tens of thousands of lines in large exchanges. For vDSL, fibre is deployed to the cabinet (FTTC) so unbundling takes place at street cabinets in most instances which means entrants have perhaps hundreds (or less) of lines for each street cabinet they build to, meaning that comparable economies of scale are not available.

the future. France, Portugal and Spain pursued an investment strategy based on FTTH infrastructure investments. While consumers may have access to a smaller number of offers, the evidence from the literature (supported by the evidence from these Member States) suggests that entrants with control over their own infrastructure deliver a very vibrant form of competition to end-users.

While all three countries had different starting positions, they all took actions to address weaknesses. For instance, Spain traditionally had a relatively weak access regime in place to give alternative operators control of LLU lines and had an, at-best, 'nascent' passive access regime. However, Spain took action to lower copper prices in 2008 and to establish an effective passive access regime. In 2008 Spain dropped LLU prices by more than 20%, which led to a significant increase in full LLU take-up by alternative operators moving from a base of approximately 700,000 lines in mid-2008 to 1.5 million in mid-2009 and 2 million lines by early 2010 - thereby creating a strong competitive base on which to build.

It has become increasingly clear that copper upgrades did not need any special treatment. The relatively low cost for upgraded copper taken together with the fact that significant operational costs are moved into capital expenditures (an upgraded copper line often overlaps/displaces day-to-day repair and maintenance work on the network) meant that the actual level of investment in this period of rapid network 'upgrade' did not grow⁴.

The regulated response in the three countries favouring vDSL is worth noting for comparison purposes. Telecom operators in the UK, Germany and Belgium all clearly embraced upgraded copper, driven also by strong competition of cable operators. While both BT and DT initially claimed to be prepared to make a proportion of their network upgrades in FTTH, those intentions have largely dissipated over time⁵. Belgium was an early adopter of vDSL having already made investments as early as 2004 and Proximus recently announced plans to deploy FTTH at the same time that Orange in Belgium announced its own intentions for FTTH investments. In all three countries, vDSL investments have been supplemented with higher rewards: in the case of the UK – BT was awarded very significant public money to extend the vDSL network by the BDUK fund; in Germany, access conditions were not overly onerous; while Belgium went so far as to withdraw the sub loop unbundling (SLU) obligation on the incumbent Proximus in order to facilitate vectoring (a further technology increment on vDSL) effectively ruling out any form of access other than virtual remedies.

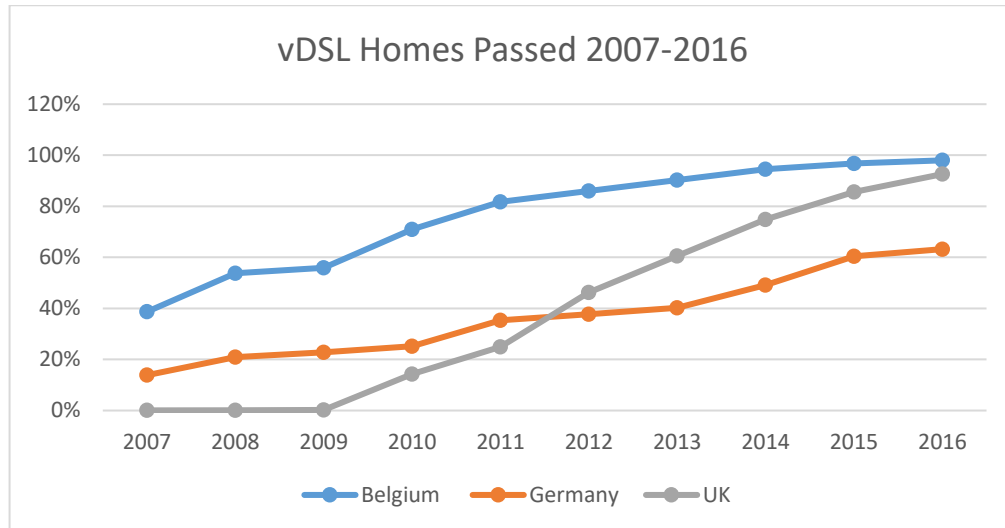
The net impact has been quite dramatic in all three markets despite the significant differences in performance visible in figure 9 below. What is remarkable is the speed with which copper upgrades can be made when the decision is taken to go this route. The UK was a late convert to the need to upgrade (with the exception of a few local initiatives) and yet, from a standing

⁴ ETNO Economic Reports 2010, 2011, 2012, 2013

⁵ According to the 2016 iDATE data for FTTH Council Europe, less than 3% of DT's upgraded access lines are FTTH while less than 1% BT's upgraded access lines are FTTH.

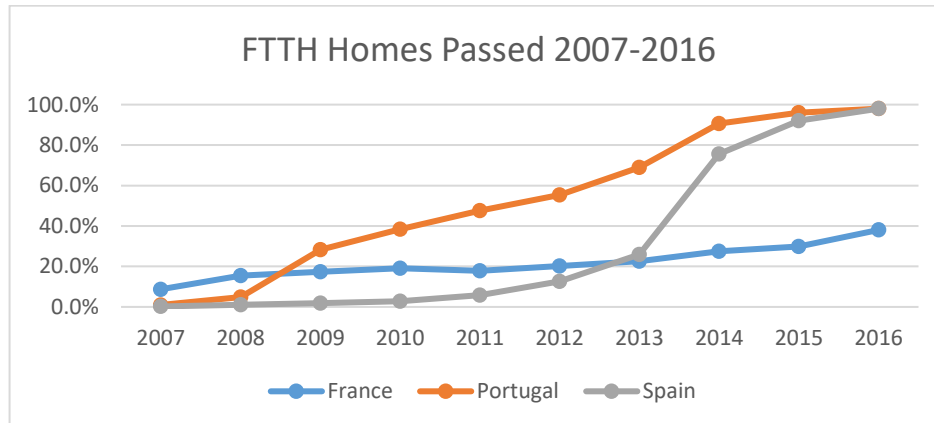
start in 2009 it had 4 million homes passed with upgraded copper by 2010, 13 million in 2012, and 26 million by the end of 2016.

Figure 1: Copper upgrades Belgium, Germany and UK ⁶



What happened to the class of 2008 who pursued an investment strategy based on FTTH infrastructure investments?

Figure 2: FTTH Homes Passed in France, Spain and Portugal ⁷



While it is clear that all three markets achieved very significant FTTH coverage over the same period, what is particularly striking is the relative position of alternative operators in each of these markets as shown in figure 3 below.

The lesson for Germany from these different approaches is that the principal difference between the two groups of countries is in terms of the market structure that emerges and the performance of alternative telecommunications operators (i.e. excluding cable TV

⁶ iDATE data for FTTH Council Europe and BCE - Broadband Coverage in Europe 2012. The extent of the overlap between DT's vDSL network and Vodafone's vDSL network is not indicated so significant double counting may (or may not) arise.

⁷ iDATE data for FTTH Council Europe, data at December 2014

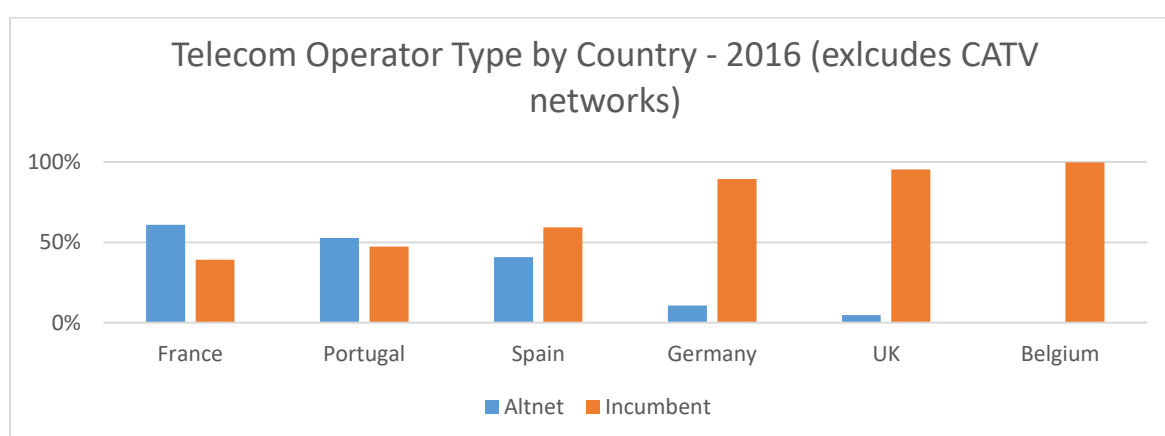
network operators). See figure 3 below, alternative vDSL operators have close to zero coverage in the UK and Belgium. Vodafone has undertaken some build-out in Germany but it still relies on regulated access to the DT network in order to connect to the end user.

Conversely, the performance of alternative operators in FTTH markets is remarkably strong in the context of European telecoms.

The absence of virtual access remedies incentives access seekers to build out their own networks and incumbent telecom operators, being confronted with less regulation and more regulatory certainty, reacted by building their own FTTH networks. Telefonica in Spain seems to have spotted a trend early judging by the rapidity with which it reacted once its competitors started to deploy FTTH at scale.

The result of these interactions is that a very large number of access paths have been created, which are almost completely independent of the incumbent operator. The typical pattern starts with independent deployments by multiple alternative operators, followed by striking commercial or not conventionally regulated deals by the network owners, once a critical mass has been achieved. A forward looking view sees these markets relying on competition between copper, cable and more than one FTTH network.

Figure3: Telecom Network Operator type across countries in 2014⁸



Meanwhile the dependence of entrants on continued access to copper products in non-FTTH countries has not gone unnoticed, and many vDSL countries as well as the Commission have spent enormous resources on establishing the appropriate copper price. Equal emphasis has been placed on setting appropriate ex ante margin squeeze tests, in the knowledge that should either the copper or the vDSL access element fail to function properly, a significant negative impact on competition would ensue.

⁸ Source: IDATE data for FTTH Council Europe. Alternative operators in France are Bouygues, SFR, Iliad, local authorities. Alternative operators in Portugal are Vodafone, Sonaecom and about 14 smaller operators. Alternative operators in Spain are Jazztel and Orange as well as some local initiatives.. There is very little meaningful alternative competition in the UK or Belgium.

The 2013 Recommendation on Non-Discrimination and Costing sought to grant some respite from access conditions for parties that invest in NGA (but again with no distinction between copper upgrades and FTTH).

WHAT ALTERNATIVE POLICY SHOULD BNETZA CONSIDER?

The lessons for Germany seem clear, regulating virtual access to existing infrastructures is unlikely stimulate significant investment or competition in the traditional telecom network. In fact, the continued emphasis on such access and the weakening of the access form (an increased emphasis on virtual access) has undermined the incumbent telecom operator's own incentives to invest in its network. If Germany were to follow the development path of Spain, Portugal or France one would expect to see entrants – existing telecom operators, foreign/global operators, operators from other sectors or a combination of operators/investors – building their own networks and that would also compel the incumbent to invest further in its network. Taking into account the German context, the creation of an in-building wiring regime, the coordination of digging requests among different parties, the co-investing and co-sharing duct practices; the streamlining of digging permits and more generally the reduction of administrative costs; the lowering of the criteria for granting permits are likely to have an important impact on the roll-out costs for new and existing operators. In addition, factors which would undermine network build outs (for instance various taxes on infrastructures) should be actively avoided.

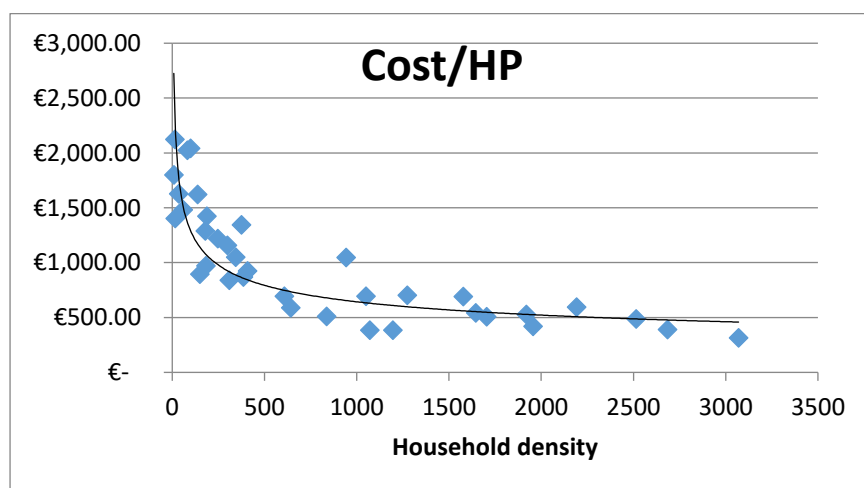
In order to plan for the medium term, BNETZA should develop measures for enabling and facilitating deployment such as an accelerated permit granting regime for build-outs, stronger coordination between infrastructures for digging and preventing network taxation. Germany will have to address these issues when it transposes Directive 2014/61/CE on broadband cost reduction (Cost Reduction Directive). In this context the German government, with support from BNETZA, could seek to implement that Directive taking into account the specifics of the German market (e.g. the lack of extensive duct infrastructure and high administrative burden). These measures will have the added benefit of signalling clearly to the market where and how BNETZA sees the market developing.

Even the measures outlined in the above section have certain limitations, because, outside urban areas, the scope for infrastructure based competition is limited by the cost of deployment in those less densely populated areas. Another approach should be considered in these areas of low population density.

While the Commission has done a lot to encourage EU Member States to develop National Broadband Plans it has also been quick to recognise the legitimate need for public funds to

push broadband access into the remotest areas. The Juncker Investment Plan⁹ and DG Competition State Aid rules¹⁰ all seek to enable and facilitate such use of public funds. Mapping the availability of broadband in Germany and the form of that availability is a first step. Once those white areas where broadband or adequate broadband will not be available are identified public funding may be considered to ensure availability (with normal tendering and transparency rules applying). Public funding should be strictly limited to those white areas where there is no other possibility for very ultrafast network deployment to avoid distorting the commercial market. It is further recommended that a liberal access regime be applied to the network in this area to reflect both the lack of potential end-to-end competition and to ensure that consumers have a competitive choice. While BNETZA know the potential scope of competition best in Germany, the FTTH Council in its cost modelling work has seen a significant flattening of the cost curve in areas where population density goes above 400 per square kilometre (some exceptions may occur where business density is high). The FTTH Council believes structural indicators such as this should be given a significant weighting in deciding those areas which are susceptible to infrastructure based competition.

Figure 4: Cost Per Home Passed by Population Density¹¹



The FTTH Council believes that European markets need to move past copper as quickly as possible to enable Europe to deliver all those services and functions promised in the vision of a Gigabit society. Germany needs to ensure that it has the future proof networks that can deliver the capacity and quality of service when needed without major upgrades or delays. The FTTH Council firmly believe that only FTTH networks can deliver that outcome but are happy to simply have the outcomes specified (even as the Commission has proposed in its Code as, at least Fibre To The Building or better) and let the technologies fall where they may.

⁹ http://ec.europa.eu/priorities/jobs-growth-investment/plan/index_en.htm

¹⁰ EU Guidelines for the application of State aid rules in relation to the rapid deployment of broadband networks (2013/C 25/01)

¹¹ http://ftthcouncil.eu/documents/Reports/2017/FTTH%20Council%20Cost%20Model%202017_final.pdf

In the FTTH Council's view, Germany's recent conundrum of how to address the regulation of near shore lines while allowing technological upgrades and at the same time, seeking to maintain competitive operators is a reflection of a broader policy issue. While these short term issues are not unimportant but they should not blind us from the broader picture; Germany needs a major telecom infrastructure upgrade if it is to deliver on its potential in the industrial internet, IoT, virtualisation, driverless cars.... – the list is endless. A cheap and incremental approach may suit certain operators and their shareholders but it risks imposing a huge cost on the German economy and society.

Germany is also becoming increasingly isolated in its policy position. While Spain and France made clear their intention to move quickly to FTTH, Germany and in particular the UK chose to pursue an upgraded copper path. The UK has recently concluded a major Strategic Review of its policy wherein Ofcom concludes that it should pursue a policy which is broadly similar to that in Spain, France and Portugal in order to achieve FTTH networks by relying on passive infrastructure access to stimulate FTTH investments by alternative operators.

The FTTH Council has consistently advocated this approach which we see as having 3 key components, a strong emphasis on FTTH as an objective, creating appropriate incentives for all operators to invest by removing virtual access remedies at the appropriate time and finally, lowering barriers to entry by sharing in-building wiring and outside passive infrastructure.

Clearly the economics and the associated approach needs to be different between urban and rural areas but where these measures have been put in place the transition to FTTH has been impressive, hence Ofcom's change in policy in the UK.

The policy proposed above requires competing network operators to actively change the market themselves and, thereby, to move the German investment focus to FTTH/B. However, for a possible future change of policy in Germany to have a chance of success, current policy must first ensure that existing competitors remain in the market long enough (and strong enough) to leverage that change in policy. Today, the German market has a number of strong actual and potential network investors, the FTTH Council Europe believes that by enabling a series of measure to facilitate future investments, that Germany's network ambitions can be realised.

GEOGRAPHIC SEGMENTATION

The FTTH Council believes that Bundesnetzagentur should be explicit about the need to geographically segment the market and that this is preferable to an alternative approach which would be to apply different remedies in different parts of a national market. The conditions of competition have been markedly different within certain Member States that have found a national market but put different remedies in different geographic parts of that market .

In whatever way it is achieved, either by geographically segmenting the market or varying remedies within a national market, the FTTH Council believes regulators must focus their interventions where they can have maximum impact with a set of remedies in those areas where effective competition in market 3a is potentially possible and complimented with another set of remedies where effective competition in market 3a might not be possible.

The Council recognises that there are likely to be large differences in the possibility for network competition in Germany between densely populated urban centres, sparsely populated rural areas and the areas in-between. The FTTH Council also believes that there can be competing networks in urban centres, that there may be no FTTH network in rural areas without public support and that there may be very limited competition on fibre networks in-between.

The FTTH Council believes that Bundesnetzagentur should geographically isolate areas where the prospects for physical competition are greater from those areas where such prospects are not so great the analysis presented is too static and is based on what has happened in the past. The FTTH Council believes that the assessment that needs to take place should be forward looking and should happen regardless of the current state of competition in these areas but be based on an identified potential to support competition in order to ensure the broadest geographic areas for infrastructure competition.

While the FTTH Council welcomes Bundesnetzagentur's consideration of a greater need for geographic differentiation, there needs to be a willingness to accept that different competition is likely to emerge in different areas based on a more forward looking approach.

The FTTH Council believes that there should be a stronger correlation between the treatment of geographic segmentation and the treatment of geographic markets in the State Aid Guidelines. The SMP process which includes both product and geographic market definition in stage 1 must be conducted on a forward looking basis. This is also true of a State Aid assessment which takes a (proposed) five year forward looking perspective to determine which areas are to be classified as white (no prospective infrastructure) grey (only one prospective infrastructure) or black (more than one prospective infrastructure). If such an assessment can be conducted for a State Aid assessment then it is equally capable of being conducted in the context of an Article 7 market review.

A determination of where, geographically more than one prospective infrastructure could be deployed would warrant a different treatment of that area. As noted above and shown in Figure 4, population density is strong driver of network costs and thereby, of viability and should be considered for the purposes of delineating geographic areas (business density could also be important in certain geographies). Where parallel networks are not viable, BNETZA should concentrate their efforts to making sure that other forms of access, where appropriate, are put in place as effectively as possible. In particular, other remedies which would undermine the incentives to make the appropriate investments should not be available on that market and more importantly, it should be clearly signalled ahead of time

that they will not be available. Where parallel networks are not viable or effective infrastructure sharing is not feasible, Bundesnetzagentur should concentrate their efforts on making sure that other forms of access are put in place as effectively as possible in the appropriate market analysis (market 3b).

CONCLUSION:

A SUGGESTED PATH AHEAD FOR GERMANY BASED ON EU EXPERIENCE

This submission suggests that there is evidence from around Europe showing that well planned and executed remedies can facilitate infrastructure based entry in a FTTH context and enable end-to-end competition over the vast majority of households. The drivers seem to be consistent across markets and are twofold. Where infrastructure competition is viable incentivise investments by limiting access remedies and enable that competition by lowering deployment costs through a variety of measures.

Experience has shown that the benefits of end-to-end infrastructure based competition far outweigh these of service based competition in the long run. However, in recent years fixed investments by DT were mostly directed towards upgrading its copper network, instead of large scale FTTH investments like we have seen in other EU Member States. The result has been a weakening of the competitive fringe and the potential for large scale network entry. The competitive fringe remains strong in Germany and as the largest European market, the potential for large scale entry is strong.

However, investments in VHC network roll-out by third party access seekers only takes place when virtual access is less attractive than the appropriate physical access. In other words, virtual access regulation does not stimulate network investments, while physical network element access measures such as duct or in-building wiring will, if well considered and designed. While option pricing remains a possibility, it has not yet been achieved with success anywhere in Europe— bright line rules about the form of access are far more effective as seen in other European markets.

Based on these considerations the following is the suggested path to stimulate increased infrastructure investment and sustainable competition in the German Broadband market.

- 1. BNETZA should contemplate assessing the overall electronic communications market and set out a comprehensive plan to achieve increased investment and competition.**

That plan should be explicit and should simplify the access regime in the short term and change the paradigm for competition in the medium term. By doing so it should identify ineffective access regulation and propose access regulation that encompasses a clear investment stimulus. It is important to signal this change clearly to market operators.

- 2. In its assessment of the market, BNETZA should map the availability of broadband infrastructures and identify where competitive infrastructure build-out is viable.** The FTTH Council believes that Bundesnetzagentur should be explicit about the need to

geographically segment the market and that this is preferable to an alternative approach which would be to apply different remedies in different parts of a national market. The conditions of competition have been markedly different within certain Member States that have found a national market but put different remedies in different geographic parts of that market.

In whatever way it is achieved, either by geographically segmenting the market or varying remedies within a national market, the FTTH Council believes all regulators should focus their interventions where they can have maximum impact with a set of remedies in those areas where effective competition in market 3a is potentially possible and complimented with another set of remedies where effective competition in market 3a might not be possible.

3. In the medium term, the experience from other countries in Europe suggests that the essential components to stimulate infrastructure based competition are twofold.
 - a. **The first set of measures are principally about creating the incentives to invest**, often this is the most difficult part but requires the gradual removal of virtual access remedies in order to stimulate infrastructure investment.
 - b. **The second set of measures are about efficiency and lowering barriers to entry** (e.g. measures such as access to ducts/trenching, co-ordination of in-building wiring, accelerated permit granting and so on).
4. **The parameters of the transitional regime** (to move from the current access regime to that outlined immediately above in point 3) should be set out for the urban areas: what access products will be available and for how long.
5. **In white areas where competitive network build will not be possible, public funding should be considered.** An extensive set of access products including wholesale virtual access products may be required in order to ensure sufficient service based competition.

While measure 3b above will be largely covered by the Cost Reduction Directive, it is important that the transposition of this Directive takes the specifics of the German market into consideration. The relative lack of ducts and trenches as well as the complicated nature of infrastructure sharing systems, suggests that measures such as the coordination of digging requests between telecom operators and other infrastructure providers, streamlining digging permits, lowering the criteria for granting permits are likely to have a far greater impact on deployment costs. Taken together with technological advances in deployment and the relative ease of deployment in Germany, a strong prioritisation for infrastructure sharing should be given.

The objective is to create long-term infrastructure based competition, instead of short-term service based competition. Evidence from other EU Member States proves this goal is realistic and can be achieved if appropriate measures are taken. With smart regulation in place – a combination of appropriate ex-ante regulation and measures to lower network deployments costs – Germany may continue to be a leading broadband country in the decades ahead.

Finally, the policy proposals contained herein will require important efforts on the part of BNETZA both in terms of implementation and in terms of ongoing monitoring. These strains on the existing resources at BNETZA further emphasise the need for their policy interventions to be clear and focussed.