Contribution of France Telecom Orange Group to the public consultation of the European Commission on a Draft Recommendation on regulated access to Next Generation Access Networks (NGA)

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ANNEXES

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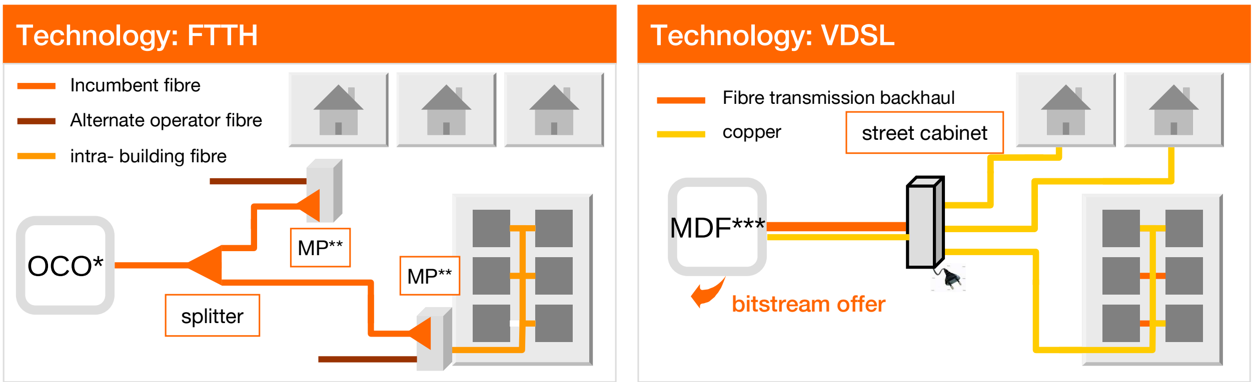
C : Internal paper on the comparison of options for NGA investment, competition and commercial success

Comparison of options for NGA investment, competition and commercial success

This note is meant to compare different NGA investment and competition models, regarding their scores in terms of product innovation, process innovation, coverage, prices and choices for consumer.

First, what investments are concerned? The figure below explains the investments which are needed in order to deploy NGA, depending on the chosen technology: VDSL or FTTH.



Relevant Investments (FTTH)

- Optical Line Terminal at the Optical Central Office
- Incumbent and alternate operators fibre and splitters (+ fibre-specific investments in ducts)
- Intra-building fibre

Relevant Investments (VDSL)

- Transformation of street cabinets to accommodate VDSL DSLAMs (energy, cooling, security, …)
- VDSL DSLAMs at the street cabinet
- Fibre backhaul from street cabinet to MDF

* OCO: Optical Central Office ** MP: mutualisation point ***MDF: Main Distribution Frame

Options for private investment and competition in NGAs

The different options regarding NGA investment and competition models are infinite. However, from the current regulatory debate, it is possible to characterise 5 major options:

1. Competitive private investments,

2. Complementary private investments with voluntary reciprocal access between competitors,

3. Separation of the access activity (utility model),

4. Private investments by a single undertaking with rich win/win (regulated or commercial) wholesale access contracts for competitors,

5. Private investments by a single undertaking with traditional, unconditional price per access for competitors,

Features to evaluate the options

The features which characterise the different models, and which will serve as criteria to score the global performance of each model, can be summarised as follows:

- Static cost efficiency, for given technology/productivity: in other words, the static over cost of duplication compared to mutualisation.

- Dynamic cost efficiency / process innovation: in other words, the ability of the model to enhance faster learning curves for operational and roll-out costs, and higher technical progress to minimise cable and equipment costs.

- Incentive for extending the geographical coverage: are operators in a process which maximise their incentive to extend their geographical coverage, or are they better off concentrating on the densest zones?

- Demand oriented retail prices: are operators free to adapt their price structures in order to meet the heterogeneous customer demand, or on the contrary, are they submitted to rigid constraints leading to "one size fits all" prices on the retail market?

- Product/service innovation: do operators have a full end to end control of their technical chain and are therefore able to freely introduce product innovation for their customers, or, on the contrary, are their innovation processes under the control of administrative multilateral processes, with slow decision processes and minimal scope for service differentiation, if any.

- Incentive for achieving high market penetration: is the business model of retail operators based on de facto variable infrastructure costs, with incentive for low volumes and high margin and retail prices, or the business model of retail operators is based on de facto high fixed infrastructure costs and low variable infrastructure costs, with incentive for high penetration.

- Low network entry barriers: is regulation optimised to favour network entry?

- Low service entry barriers: is regulation optimised to favour service entry?

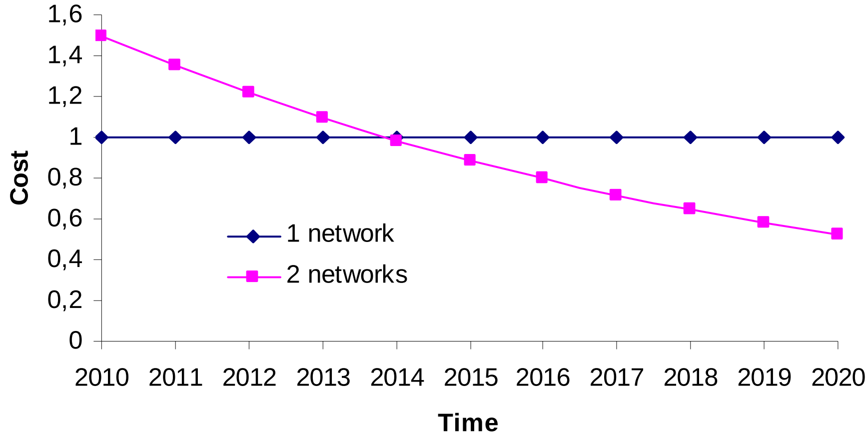
Static versus dynamic cost effects: a toy example

Before analysis how each of the 5 competition and investment models score regarding the different criteria which have been exposed above, it is useful to take some time to explain the massive material behind the notion of dynamic versus static efficiency. Even on pure costs considerations, and not taking into account the long term issues of innovation and sustainable competition, dynamic efficiency effects are nor marginal when compared to static efficiency effects and may easily dominate static efficiency effects.

This can be demonstrated on a simple toy example, comparing the model of a single monopoly network versus a model of two competing networks to serve the same demand on a pure cost basis:

- Typically, the loss of scale effects may bring the static cost of two networks 50% higher than the cost of a single network.
- However, the competitive pressure on network roll out activities may easily bring an extra minus 10% per year on learning curve and technical progress.
- Under such hypothesis, two networks become cheaper than one network after only 4 years of network competition, as shows the graph below:

Static versus dynamic effects



A fibre local access network is not a "silly" infrastructure and will strongly benefits from competition in the network roll-out activity

Rolling out fibre is sometimes perceived as a pure manpower activity made of digging tens thousands kilometres of trenches without any hope of productivity improvement. Such a view does not correspond to reality. In reality, it is a very technical and integrated activity, provided existing ducts and poles infrastructures can be reused. It implies learning in the specification of materials and equipments, in the sourcing process, in the design, the roll-out and testing process, in the customer production processes.

To illustrate this point, one can notice that the classical roll-out of backbone and backhaul fibre infrastructure, corresponding to fibre quantities one or two orders of magnitude smaller than what would be necessary for rolling out fibre in the access network, already experience very significant technical progress.

From this observation, it derives that technical progress will obviously reach a 'two digits' figure per year in case of massive roll-out in the access network, provided competitive pressure is at work and therefore provided network roll-out does not become a monopoly activity.

Significant technical progress is already observed in GPON equipments, and operators will be able to switch from GPON to new GPON technology at the beginning of next decade.

Therefore, on pure cost aspects, dynamic cost efficiency effects is likely to dominate static cost efficiency effects

Approach for an evaluation of the investment and competition models

This paragraph illustrates, on a representative set of examples, how the 5 models may be rated against the different criteria which have been defined.

For instance, concerning the criterion "Low service entry barriers", the best option is standard access obligation because there is no need to pay upfront or fixed cost to enter the market. Also, the access infrastructure and products are technically specified to be relevant to feed the retail market, as they have been defined using information from the retail market, thanks to the vertical integration of the access provider. There should not be the same level of adaptation from the infrastructure to the needs of the retail market with the activity option "pure access activity" which therefore is ranked second. Third is the "rich access contract" option, which still allows entering the market without investing, but with commitment of the access beneficiaries towards the access provider. The two last options do not allow market entry without investing. The investment takes place only for a geographical part of the market for the “reciprocal access agreement” option which therefore is fourth. The investment has to take place on all the addressed market for the “infrastructure competition” option.

If the example of the criterion “low network entry barrier” is considered instead of “low service entry barriers”, then “infrastructure competition” appears to be first, because under these options, network roll-out is given maximum facility and efficiency.

Infrastructure competition has logically the best ranking for all features, except static cost efficiency and low service entry barrier, for which it has the worst rankings.

The economic structure of the undertakings operating on the retail market, in particular their fixed and variable costs have a particular impact on their incentive to have a large number of customers and favour a high and fast penetration of the service. With high fixed costs and low variable costs, there is a strong incentive to reach high penetration. On the contrary, with no fixed cost and high variable costs, the incentive is to have high retail prices on top of high variable cost, and service penetration is not a critical issue. In this respect, reciprocal access agreements and rich access contracts have similar cost characteristics than infrastructure competition: fixed cost as a counterpart of reduced variable cost. All three options give incentive to favour service penetration.

However, rich access contract, when compared to infrastructure competition, benefits from static cost efficiency but looses dynamic cost efficiency. Reciprocal access agreements, retains some of the dynamic efficiency of infrastructure competition, as several undertakings are rolling-out there own network. Reciprocal access agreements also benefits from static efficiency, possibly at the expense of coordination and standardisation issues on a technical point of view, and transaction costs concerning the economic condition of reciprocal access.

By contrast, the two options “standard access obligation” and “pure access activity” have the very important drawback to artificially transform actual fixed costs into apparent variable costs at the frontier of the access activity, as far as retail pricing is concerned. This artefact will lead to globally wrong pricing and investment decisions. In particular, it will make it impossible to apply efficient value pricing and penetration pricing strategies. This will severely limit the value which can be extracted from the market, and therefore the incentive to extend the investment. It will also severely limit the possibility to adapt prices to customer’s willingness to pay, in particular for low value customers, drastically limiting the penetration of the service. That is why they are badly ranked on penetration and demand associated features.

Let’s now consider more specifically the pure access activity option. Technically it will be a monopoly, so it will not benefit from any competitive pressure to reduce costs. It will face hard coordination and conflicts of interest between downstream and upstream, concerning investment and prices. It will ignore information and incentives from the retail market and may take ill-informed decisions.
Competing downstream undertakings using the upstream access will moreover have contradictory demands concerning investments, processes, coverage, technologies, interfaces, prices of the upstream monopoly. The only way to solve these contradictions may be either from the upstream monopoly to break non discrimination and favour one downstream operator, or from the downstream competitors to make agreements which risks not to be fully compliant with article 81 of the Treaty.

Coverage will of course be better guaranteed with high dynamic efficiency and competitive race between fibre operators to reach customers by extending their networks. On the contrary, of course, pure access activity or standard access obligation options mean no pressure for technical efficiency nor competitive incentive for coverage, rigid retail pricing and therefore low coverage.

Basic comparison of the investment and competition model regarding all criteria

All these considerations are summarised in the table below. Each figure in the table is meant to rank, 1st, 2nd, 3rd, … the different competition and investment options regarding the different features we are considering. Then rankings are added on all features in order to identify the best options overall. Figures given in the table are rankings: therefore, the lowest, the best.

The total of the rankings 1+2+3+4+5, which makes 15, is written on the bottom line of table. It can be seen on the bottom line of the table that rankings have been written in such a way that all considered features have the same total weight of 15, even in the cases where several investment options appear to be fairly equal regarding a feature and therefore have the same ranking in the table.

All in all a basic sum of rankings per criteria lead to the following global ranking: first infrastructure competition, second rich access pricing, third reciprocal access agreements, fourth standard access obligations and last pure access activity.

Rank	Static cost efficiency	Dynamic cost efficiency	Incentive for coverage	Demand oriented retail prices	Product innovation	Market penetration	Low network entry barriers	Low service entry barriers	Unweighted total ranks	**Global Rank**
Infrastructure competition	5	1	1	1	1	1	1	5	16	**Best**
Vol complement invest + reciprocal access	2,5	2	2	2,5	3,5	2,5	4	4	23	3rd
Pure access separated activity	2,5	5	4,5	5	5	4,5	5	2	33,5	**Worst**
Rich access contract	2,5	3	3	2,5	2	2,5	2,5	3	21	2nd
Standard access obligation	2,5	4	4,5	4	3,5	4,5	2,5	1	26,5	4th
Total	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*		

Obviously, if this evaluation model is used on a more practical basis, the different criteria should be weighted more carefully, and will depend on the particular piece of investment concerned, on whether the investment takes place in dense or non dense areas, or on whether it takes place at the beginning of the learning curve or later, when technologies and processes have reached a certain degree of maturity.

D : [confidential]

E : Internal paper on the evaluation of the grey zones coverage in France

In France, areas where an FTTH access network is a profitable natural monopoly, "grey areas" in European Competition Law terminology, should represent 12% or less of the national access market

A critical parameter for investment and competition in FTTH access networks is the number of parallel access networks which can be simultaneously profitable in a single local area.

In this regard, European Competition Law defines three categories of areas:

- "black" areas, where at least two parallel access networks can coexist and be profitable at the same time and where there is, a priori, no market failure[1],
- "grey" areas", where only a single network can be profitable and where regulation is needed to compensate for the absence of infrastructure competition; however, regulation should be fine-tuned to keep investment incentives alive otherwise, regulation will turn "grey" areas into "white" areas,
- "white" areas, where even a single network would not be profitable and therefore no private investment can be expected. Public subsidies are necessary to obtain fibre coverage.

"Black" areas and "white" areas are a common situation in a market economy and do not call for sector specific economic regulation:

- regulation by ex post application of competition law for "black" areas, in particular article 81 against collusion and article 82 against abuse of dominant position,
- State Aid rules or Altmark criteria for Services of General Economic Interest for "white" areas.

The situation of "grey" areas is more original in a market economy and may require specific asymmetric rules applying to the owner of the single infrastructure.

It derives from this that the issue on whether or not commercial activities based on FTTH access networks may require a heavy handed sector specific economic regulation, or, on the contrary, a light approach, depends on the proportion of "grey" areas, to "black" and "white" areas, in the total market:

- either "grey" areas represent a significant proportion of the total market, and a specific asymmetric regulation will play a major role in the regulation of FTTH services,
- or "grey" areas represent a small portion of the total market, and then regulation should rely mostly on European Competition law.

The present note shows that the boundaries of "grey" areas are structurally limited by simple self-consistency constraints concerning the conditions of profitability of a fibre access network, provided that regulatory conditions allow all market players to face non discriminatory cost conditions for the roll-out of their respective networks.

Applying these constraints to French local areas where FTTH networks are supposed to be/ be installed, leads to the conclusion that **"grey" areas represent a maximum of 12%** of the total fibre access market.

Therefore in France, grey areas will represent a very limited proportion of the market. Beyond what is necessary to ensure non discriminatory network roll-out cost conditions between FTTH operators, sector specific asymmetric regulation, only justified by the existence of "grey" areas, should therefore have a limited weight relatively to ex post competition law in the regulation of FTTH based services in France.

The lower limit of black areas corresponds to areas twice as dense as the higher limit of white areas

When calculating the potential profitability of an FTTH network, the most critical parameter to take into account is the household density per km² of the local area to be served. Of course, a detailed calculation of the profitability of a specific area would involve many other parameters, but for a global assessment of the profitability of FTTH networks in local areas, household density is the most critical. Therefore, we can characterise the borderline between "white" areas and "grey" areas, where a single access network starts being profitable, by a threshold of density D household per km².
As a possible example of a scenario for a given commercial demand: a local area will be profitable for a single FTTH network as soon as the household density is above D per km².

All other things being equal, if one FTTH access network may be profitable as soon as household density exceeds D customers per km², then two FTTH access network may be profitable when household density exceeds 2.D per km². This is because, provided network operators are placed under non discriminatory conditions for network roll-out and customer acquisition, each of the two operators may claim to have half the market on its network. Therefore each of the two networks benefit from a household density D per km² and per network, which is sufficient enough to be profitable[2]:

- concerning revenues, regulatory constraints which prohibit monopoly income allow the assumption that the average revenue per customer will be equivalent despite whether several networks serve the area or not. In an area of density **2D per km²**, 2 networks will therefore each have a revenue equivalent to that of a single network/an equivalent revenue of a single network in an area of density D per km².

- concerning costs, the total cost of two networks competing in an area of density 2D is, at most, twice the cost of a single network serving an area of density D. This is because, if the cost of an access network depends on customer density, which is the hypothesis suggested in the context presented in this study, building an access network in an area of density D costs C. If, in an area of density 2D, there are two identical networks each serving half of the total market, therefore each benefiting from a density D, then each one will cost C and together they will cost 2C, if no costs are shared between the two networks. Also, if the market is not equally shared between the two networks, the total cost of the two networks will be lower than the total cost that would occur if the market was equally shared, from a well-known propriety of concave functions, such as network cost as a function of density.

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The profitability limit for two parallel networks therefore corresponds to a density of 2.D households per km² or lower. For the sake of simplicity, we will consider in the following that this threshold of profitability is simply equal to 2.D, which may overestimate the weight of grey areas, those where a single network is profitable and where two would not be profitable.

Hence, there is a mathematical relation between:

- on the one hand, household density Dwg, which is the boundary between white areas and grey areas : Dwg is the minimum density allowing one network to be profitable,

- on the other hand, household density Dbg which is the boundary between black areas and grey areas: Dbg is the minimum density allowing two parallel networks to be profitable. It is enough for each of the two networks to reach a minimal density of Dwg to be profitable. This will be the case as soon as the local area has a density of 2.Dwg. Therefore the limit between black and grey

[2] The reasoning is explained here for the case of 2 networks because it is particularly relevant in terms of competition. However, it can be directly extended to the case of N networks.

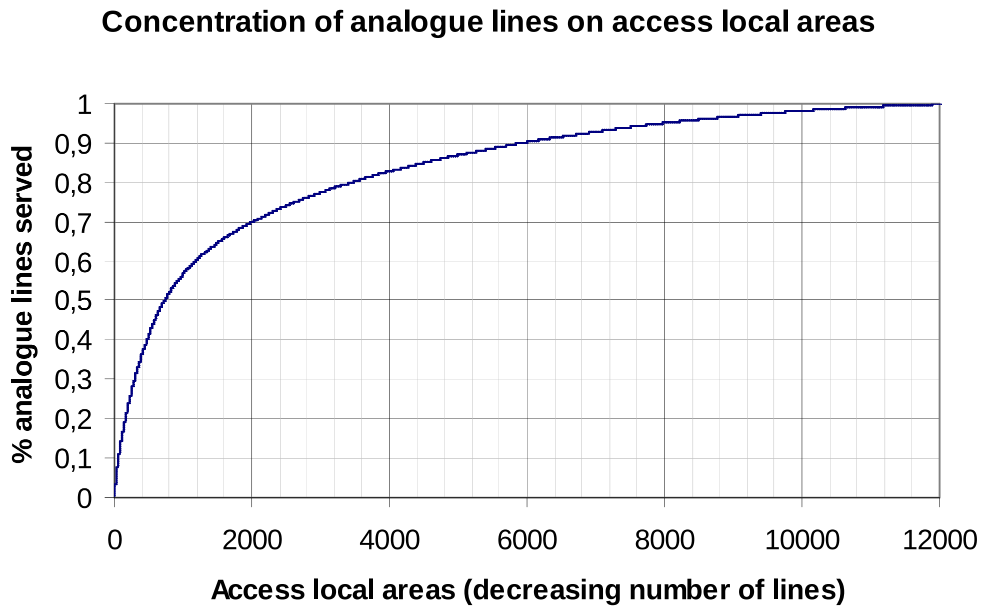
areas corresponds to a density Dbg, equal to twice the density Dwg, limit between white and grey areas.

- We can write the equation Dbg = 2.Dwg (Equation 1)

Grey areas correspond to areas whose densities are between Dwg and 2.Dwg.

A good approximation of the variation of household density per km² in France, measured at the level of local areas of telecommunication access networks, is given by the curve of concentration of subscriber-lines on/over the national territory. The surface of local areas is, de facto, fairly constant and around 45 km² per local area over most of the territory[3], except a few tens of local areas serving the densest urban zones, which are smaller. These exceptions are not significant for our present purpose. The curve describing how lines are concentrated in local area accesses is thus a good proxy of the curve of concentration of lines throughout the territory. The curve illustrating the line concentration in local areas is presented in figure 1:

Figure 1:



Let's call F(x) this curve, which gives the percentage of analogue lines served by the x local areas with the highest number of lines. Variable x is the rank of local areas, ordered by decreasing number of lines served. For the x^{th} local area, the derivative of F, F'(x), gives the percentage of the total number of lines which is served by this x^{th} local area. To make this density homogeneous with a density expressed in number of households per km², F'(x) should be multiplied by an average national conversion coefficient Dm. Dm is equal to the average number of households per km² in France: approximately 25 million households over 550 000 km², that is to say 45 households per km². However, it will appear from the following calculation that the precise value of coefficient Dm does not influence the percentage of households in grey areas.

If the limit density of households per km² between white FTTH areas and grey FTTH areas corresponds to Dwg, then it corresponds to local are Xwg such that:

$$F'(Xwg).Dm = Dwg$$

If the limit density of households per km² between black FTTH areas and grey FTTH areas corresponds to Dbg, then it corresponds to local are Xbg such that:

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[3] This results from the physical constraints of the electric signal of analog voice telephony on a copper pair which determine the maximum distance from the MDF to the geographical limit of the local area.

F'(Xbg).Dm = Dbg

Equation (1) above indicates that the limit density between black and grey areas, Dbg, must respect the condition Dbg = 2.Dwg.

Therefore, it can be derived that F'(Xbg).Dm = 2.F'(Xwg).Dm, which can be simplified:

F'(Xbg) = 2.F'(Xwg) (Equation 2)

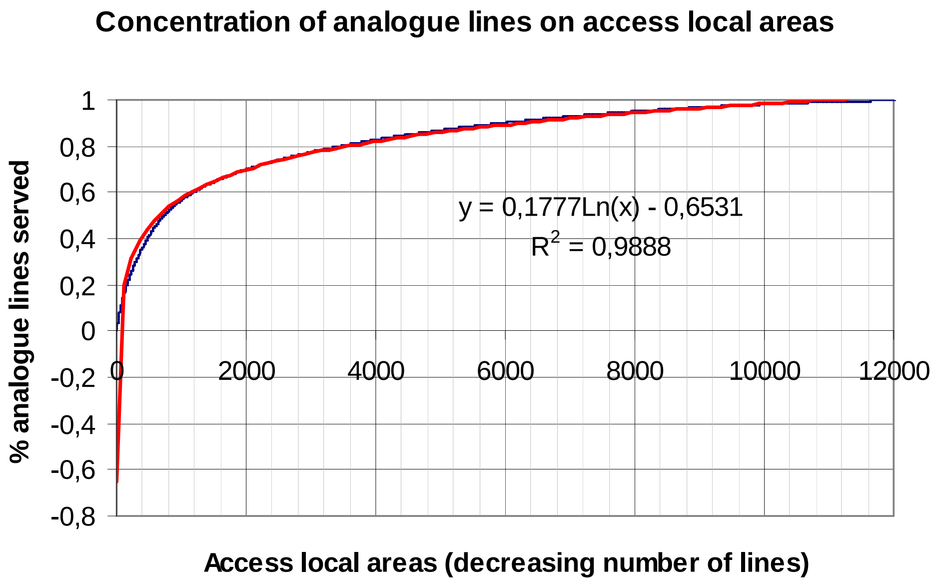
Equation 2 could be used graphically, but it would be cumbersome. It is simpler to use an analytical approximation of function F, if possible.

Actually, it is the case: Excel gives a satisfactory logarithmic approximation of F:

$$F(x) \approx 0{,}1777Ln(x) - 0{,}6531$$

The value of R^2 for this logarithmic approximation is around 0,99, which is on the whole sufficient for the purpose of this paper. The quality of the estimation may be observed in Figure 2: the approximate curve, in red, covers nearly exactly the real curve in black, except at the beginning of the curve.

Figure 2



Substituting F(x) by its logarithmic approximation, and as the derivative of function Ln(x) equals (1/x), the derivative of Equation (2) becomes:

(1/Xbg) = (2/Xwg) thus

Xwg = 2. Xbg

If the boundary between black and grey areas corresponds to the x^{th} largest local area in number of lines, then the limit between white and grey areas corresponds to (the?) $2.x^{th}$ largest local area in number of lines. The percentage of lines in grey areas is then given by the equation:

Percentage of lines in grey areas = F(2.Xbg) – F (Xbg), with

$$F(2.Xbg) - F(Xbg) \approx 0{,}1777\ (Ln(2.Xbg) - Ln(Xbg)) = 0{,}1777 * Ln(2) = 0{,}12$$

Therefore if black areas are defined by the coexistence of two profitable networks, then grey areas, where a single network is profitable, represent 12% of the access market in France.

If black areas were defined as areas where 3 profitable networks could coexist, the same calculation could be made, replacing “2” by “3”. Then grey areas would represent a percentage of the access market of 0,1777*Ln(3) = 0,20, that is ***20%*** of the total market.

This calculation concerns the technical part of the access network. Other elements of the technical network: , backhaul, transport, service platforms, as well as the commercial network correspond to larger geographical scales. Therefore, demand appears less geographically concentrated and the effect modelled in this paper is weaker. All the elements of the value chain, with their respective weights, would need to be taken into account to express profitability constraints related to the geographical concentration of the market. Such an evaluation is beyond the scope of the present paper.

F : World Top ten NGA leaders (Idate)

World’s top 10 FTTx leaders per subscribers

Choice of technology

NTT	FTTH/B GEPON	10 636 000
SK Broadband	GEPON FTTB GEPON	2 950 000
Verizon	FTTH BPON/ GPON	2 481 000
KT	FTTH EPON/GEPON	2 481 000
AT&T	VDSL2 FTTN	1 045 000
KDDI	FTTH/B EPON/GEPON	1 025 000
Beeline	Ethernet P2P FTTB	630 000
Chunghwa Telecom	FTTB GEPON	577 000
HKBN/ CTI (Hong Kong)	FTTH/B Ethernet P2P/ GPON	330 000
FastWeb	Ethernet P2P FTTH/B	285 000

Source: IDATE June 2009

European Telecommunications Network Operators’ Association

G : Internal paper on the access regulation via the ”ladder of investment” theory

The ladder of investment theory: definition and empirical results

For the past decade, access regulation has been based on the theory of the "ladder of investment". Different empirical studies have in the meantime demonstrated that the potential benefits of this theory and its implementation via access regulation in terms of broadband penetration rate and investments remain unproved. In fact, studies available show that this way of regulation can have negative impacts on investments in new access technologies in the future.

I- Definition

In 2001, the economist Martin Cave proposed a practical method of regulation in a report of the European Commission[4]. The principle is that different access levels on the network of the incumbent operator are available so that new operators enter the market at the first level which requires a low level of investment. The idea is that in a market dominated by historical operators, entrants might need 'transitory assistance' (Cave, 2006). This is a phase of services competition in which new operators gradually develop their customer base and their financial capacities. Then, the regulator will have to force them to invest in their own infrastructure and climb the next rung of the ladder. In order to do that, Cave (2006) proposed two instruments:

1. the regulator can either increase the access price so that it becomes uninteresting to stay at the first rung of the ladder,
2. either suppress the access price regulation of the first rung of the ladder; this is called a 'sunset clause'.

Once the new operators have climbed the second rung of the ladder, the regulator's incitation mechanism is repeated so that the operators climb the next rung of the ladder...
In the broadband market, the different access levels are reselling, Bitstream and the highest level is the LLU.

This method has the advantage of being easily understandable and operational. In the article by Cave 2006, the method is analysed on 6 steps, like a kind of cook recipe that regulators can apply. Nevertheless, after ten years of application of the ladder of investment, the empirical results show that this way of regulation has many limits.

II- Empirical results

We will see in this part that existing rigorous statistical analyses do not sustain the hypothesis of a positive correlation between broadband penetration and local loop unbundling (Boyle & al., 2008). At best, local loop unbundling does not have any impact (Bouckaert & al., 2008).
Elsewhere, local loop unbundling and bitstream discourage facilities-based competition. It also reduces the incumbent and alternates' operators' investments in access infrastructure (Waverman & al., 2007).
Finally, another empirical study shows that there is a significant negative correlation between the number of unbundled DSL connections per capita and the number of fiber connections (Wallsten & al., 2009).

1- "Catching up in broadband regressions: does local loop unbundling really lead to material increases in OECD broadband uptake?" Glen Boyle, Bronwyn Howell, Wei Zhang, July 2008

[4] This report was reworked and published under the title 'Remedies for Broadband services' (2004). The theory was detailed in an article named 'Encouraging infrastructure competition via the ladder of investment', Cave, 2006

This study is a response to an OECD report (2007)[5] which concludes that "unbundling... is currently more significant than platform competition in explaining broadband competition". First of all, the authors explain that the statistical estimation of the OECD study was not made properly. Once, they correct the estimation by taking into account standard errors bias there is no statically significant relationship between local loop unbundling and broadband uptake. Secondly, they explain that even if they ignore the statistical mistakes, the economic impact of unbundling on broadband only reflects the impact of the diffusion of the broadband rather than an unbundling effect. They conclude that the OECD (2007) study does not prove that there would be a positive correlation between unbundling and broadband penetration. Consequently the results of the OECD (2007) study can't be used to justify policy arguments in favour of unbundling to increase the broadband penetration rate.

2- Regulation and broadband penetration – "What is required to regain speed in Belgium?" Jan Bouckaert, Theon van Dijk and Frank Verboven, December 2008

The authors make an econometric study using panel data for 20 OECD countries over the December 2003 to March 2008 period.They estimate what are the main factors that can explain broadband penetration. Particularly, they focus on various forms of competition that is to say intra-platform competition (on the incumbent's DSL network) and inter-platform competition (between DSL, cable and possibly other networks). They show that inter-platform competition has been a key driver of broadband penetration. On the contrary, stronger 'service-based' competition (resale or bitstream access) is associated with lower broadband penetration and 'facilities-based' intra-platform competition through ULL or shared access has an insignificant effect on broadband penetration.

3- "Access Regulation and Infrastructure Investment in the Telecommunications Sector: An Empirical Investigation". Leonard Waverman, Meloria Meschi, Benoit Reillier, Kalyan Dasgupta, August 2007

The authors make an econometric study in order to test the impact of access regulation on investment in alternative access platforms in European countries. They use OECD and European Commission's data for 27 countries over the years 2002 to 2006. They show that, all else equal, a reduction of 10 percent in LLU price causes a 18 percent fall in the alternative infrastructure subscriber share. Besides, this loss of market share is not fully compensated by the increase in the size of the overall broadband market entailed by the stimulating effect of a reduction in LLU price This means that a high level of access regulation reduces facilities-based competition and its benefits. This also signifies that this reduction in subscriber lines can translate into a large impact on innovations and investments. More precisely, they estimate a direct lost of investment equalled to 10 billion euros. This weakened inter-platform competition in the present will also lower the incentive to invest in new access technologies in the future. Finally, the authors conclude that the key implication from their work is '*that regulators should not view access regulation as a costless panacea for a perceived lack of competition in the broadband market. Access regulation has costs, and these costs may well be large enough to outweigh the short-term benefits*.'

4- "Net Neutrality, Unbundling, and their Effects on International Investment in Next-Generation Networks", Scott J. Wallsten and Stephanie Hauslader, March 2009

The authors examine empirically the effects of unbundling on investment in new fibre networks in Europe. They use data from the European Commission that covers 27 European countries from July 2002 through July 2007. They find a significant negative correlation between the number of unbundled DSL connections per capita and the number of fibre connections. This means that the more a country relies on unbundled local loops or bitstream unbundling, the less incumbents and entrants invest in fibre.

[5] Organization for Economic Co-Operation and development (2007). Catching-up inbroadband – what will it take? Working Party on Commmunication Infrastructures and Services Policy paper DSTI/ICCP/CISP(2007)8/FINAL, OECD, Paris. Available on http://www.oecd.org

For the incumbents, the number of cable connections per capita provided by entrants is positively correlated with the number of fibre connections per capita provided by the incumbents.
This means that the more platform competition in a country the more investment there is in fibre.
The authors conclude that it is not clear the European policy encouraging unbundling will really facilitate neutral networks. Besides it has a cost in terms of investment in next-generation networks.

Conclusion

After nearly a decade of access regulation based on the ladder of investment theory, there is no convincing evidence based on rigorous statistical analysis that such regulation stimulates broadband penetration rate or that it gives proper incentives for investment.

H : Research paper "Rich access contracts and NGA investments", advantage of contract with commitment compared to risk premium

Rich access contracts and NGA investments

Romain LESTAGE†
Claudia SAAVEDRA‡

Abstract

This paper studies the impact of different types of access contracts on the regulator's ability to combine static and dynamic efficiency in the framework of competition for rolling out new infrastructures.

As the investment into new access networks (e.g. FTTH) is characterized by a high level of uncertainty, we first investigate how access contracts should allocate risk to induce investment under efficient conditions. The literature suggests two types of solutions: compensating the firm deploying the infrastructures for bearing the risk of investment ("risk premium") and implementing "contracts with commitment clauses" to avoid asymmetric allocation of risk between investing and non-investing firms. We show that the second solution may be more efficient than the first one since it induces lower access prices.

Contrary to the commonly accepted idea, rolling out new access networks is not only digging trenches and one can expect that the deployment costs will decrease over time because of technological progress. Using dynamic "investment rivalry" analysis - which take this technological progress into account - we underline that introducing commitment clauses allows a better combination of static and dynamic efficiency when the access prices are linear tariffs. With two-part tariffs, the variable price can be used to achieve static efficiency while the fixed part is used for dynamic objectives.

1. Introduction

The telecommunications industry is entering a new phase characterized by the deployment of new access networks. Since the late 1990s, the development of Internet access services relied on using copper networks deployed initially for telephony services. The proliferation of uses and services has raised the need for an increased bandwidth that only the roll-out of optic fiber access networks is likely to provide. Nevertheless, this new investment phase raises questions concerning the ability of telecommunications operators to finance such an infrastructure.

On the one hand, the investments into new access networks are characterized by high costs and uncertainties, on the other hand, to avoid monopolization the new infrastructures will probably be subject to access regulation (reducing the return on investment). In this view, the regulator has to trade-off between static efficiency (promoting low retail prices via a strict access regulation) and dynamic efficiency (maintaining incentives to invest and inducing timely efficient investment decisions).

Our paper examines this question in more detail. In particular, it underlines that the discussions about efficient regulation policies should not be restricted to the level of access charges. In fact, as highlighted by the literature and by our own analysis, Rich Access Contracts (e.g. access tariffs with fixed and variables parts or contracts

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including commitment clauses) are, in most cases, more efficient than simple usage based tariffs.

The paper is presented in two parts. The first one analyses the problem of investment under uncertainty. It shows that using commitment clauses to induce a more symmetric allocation of risk is more efficient than compensating the investing firm for bearing the risk of investment ("risk premium"). The second part uses investment rivalry analysis and emphasizes that when linear tariffs are implemented, the regulator has to trade-off between encouraging timely efficient deployment and increasing the consumers' surplus. Introducing commitment clauses allows a better combination of static and dynamic efficiency and two-part tariffs overcome the contradiction between these two objectives.

2. Efficient access contracts under uncertainty on demand: how to allocate risk?

In the framework of irreversibility and uncertainty, the standard usage-based access obligation can discourage the investment into new infrastructures if the access price is too low. To solve this problem, two solutions are suggested by the literature (Section 2.1): allowing relatively high access charges to compensate the firm deploying the infrastructures and providing an access to its competitor for bearing all the risk of investment (risk premium solution); allowing "contracts with commitment clauses" to share the risk between investing and non-investing firms. Section 2.2 compares these two solutions using a benchmark model.

2.1. Real optimal analysis: the limits of usage based tariffs

Investments into new infrastructures are characterized by irreversibility (sunk costs) and uncertainty. Consequently, the relevant methodology to assess investment decisions is based on the concept of real option rather than on the traditional Net Present Value criterion. Along this line, it has been suggested that the standard mandatory unbundling at total element long-run incremental cost (TELRIC), does not take into account the "real" investment cost as it does not incorporate the "option value" of the investment decision. More generally, usage based access obligations - allowing the access seeker to decide "whether or not" using the access provider's infrastructures without bearing any cost - implies an asymmetric allocation of risk (incumbents bear all the burden of uncertainty) and can discourage the deployment of new infrastructures.

2.1.1. The limits of TELRIC prices…

Access prices based on the TELRIC rule are too low since they do not reflect the total investment cost, i.e. they do not incorporate the cost of "killing" the waiting option. Equivalently, they do not compensate the firm which has invested for granting the access seeker an option to enter the market (See Pindyck, 2007 and Jorde et al., 2000).

TELRIC rule is not only "unfair", it has a negative impact on the incentives to roll out new infrastructures: investment decisions are affected by an asymmetric allocation of risk which reduces expected profits and increases the cost of capital. The first effect can be the consequence of decreased profits in good "states of the world" (entrants will seek access) and unchanged profits in bad states of the world (entrants will not seek access)[6] or of decreased profits in bad state of the world (entrants will seek access) and unchanged profits in good states of the world (entrants will build they own infrastructures whether access tariffs are regulated or not)[7]. The second effect (increase in the cost of capital) is the consequence of "increased cyclicality" in incumbents' returns (Jorde et al., 2000. pp. 19-21).

2.1.2. …and the solutions suggested by the literature

Two types of solutions are suggested by the literature: short term contract with risk premium and long term contracts (or "contracts with commitment clauses").

The first solution (short term contract with risk premium) is based on the idea that the access charge should incorporate the option value of the investment - and not only its accountable value - or, equivalently, the value of the "entry" option (granted by the access provider to the access seeker)[8]. The principle of the risk premium is to allow relatively high access charges to compensate the firm deploying the infrastructures and providing an access to its competitor for bearing all the risk of investment.

The second solution ("contracts with commitment clauses") suggests to share risk between the investing and the non investing firm. It can be described as follows: "access seekers would have to commit to paying to access for long periods of time - so that they bear some of the risk of bad outcome" (Guthrie, 2006. p. 961).

2.2. Risk premium vs. commitment

When two firms are competing for rolling out new infrastructures and face uncertain future profits, it can be assumed that the investment will occur if and only if one of the firms has incentives to be the first one to invest. However, if access to the new infrastructure is mandated by the regulatory authority firms face a second-mover advantage. In effect, it is profitable to let the other firm invest and let industry profits to be revealed without bearing the sunk costs of rolling out the infrastructure. The regulatory authority needs then to create investment incentives. Within this framework, it has been recommended to grant a wholesale mark-up to the firm that invests first called "risk premium". We present in this section the rationale behind a static investment model[9] that shows that commitment contracts between operators limit firms' opportunistic behavior and can be more efficient than risk premium wholesale tariffs.

Suppose that there are two risk-neutral identical firms that plan to enter a network-based market. In order to build the network facility firms need to bear a fixed sunk cost. However, because competition is a priority for the regulatory authority, if only one firm has rolled out the network the firm without a network will be allowed to utilize its rival's facilities to provide the service. The wholesale tariff that the network seeking firm pays to the network provider firm is supposed to be set by the regulatory authority

[6] Guthrie (2006). p.961

[7] Jorde et al., 2000

[8] See Pyndick, 2007 and Guthrie, 2006.

[9] Section based on a companion paper "Investment incentives with commitment contracts", Saavedra (2009)

before investments have been made. In this way there is no regulatory uncertainty that undermines the development of the market.

In many markets, future profits are uncertain prior to investment. This is the case in some network industries, notably in telecommunications where demand for the new generation access networks is uncertain. For simplicity suppose that there are two possible states of the world: a "good" or optimal state where margins over variable costs, or as the literature calls "profit flows", are high after investment; and a "bad" or adverse state where profit flows are rather low. In a good state of the world profit flows are high enough to profitably roll out two infrastructures. However, adverse state profits are not enough to cover double fixed costs.

Take as a benchmark the complete information case, where both firms know in advance the future state of the world. The sequence of events in this game is:

(0) The Regulatory Authority sets the access charge
(1) The firms decide if they enter into the market by investing on infrastructure, or by seeking access if the other firm invests
(2) Both firms compete in the retail market

In a bad state of the world the access charge set by the regulator prior to investments needs to be high. This is because firms anticipating low retail profits invest only if wholesale revenues help to pay the sunk cost. Formally, the access charge needs to be sufficiently high such that the return on investment for the firm that provides the network is at least as high as profits flows of the firm that will seek access to the network. Otherwise both firms will want to be the access seeker waiting for the other to build the infrastructure and the network roll-out will be retarded.

In a good state of the world profit flows are higher for both firms. Hence, as wholesale and detail margins are higher for the network provider, the regulatory authority can set a lower access charge than in the adverse state, i.e. the network provider needs less compensation for its investment.

Suppose now that both firms and the regulatory authority have a prior believe (i.e. a probability *p*) over future profits, but they have no certainty over the future market. The sequence of events if the market is to develop is as follows:

(0) The regulator sets the access charge
(1) The leading firm rolls out the new infrastructure
(2) The state of the world is revealed[10]
(3) The following firm decides to enter either by seeking access, or to bypass and roll-out its own infrastructure
(4) Both firms compete in the retail market

The potential network-seeking firm has the advantage that it can wait for the demand to be revealed before making its decision. Lets analyze the case where with high profit flows the follower builds its network and with low profit flows it seeks access.

The expected return on investment (ROI) for the network provider is:

p [ROI in facilities-based competition in a good state]
+(1-p)[ROI inservice-based competition as a network provider in a bad state]

And the expected profit for the network seeker is:

[10] Note that the information is revealed if and only if one firm has invested in stage (1). In other words, if none of the firms is willing to take the leadership, the games stops in stage (1)

p [ROI in facilities-based competition in a good state]
+(1-p)[profit flows in service-based competition as an access seeker in a bad state]

If the regulatory authority reasons in the same way as in the benchmark setting, the access charge is set to equalize the expected payoffs, or returns on investment, of both firms. Then, the regulatory authority sets a high access charge as if the state of the world was certainly adverse.

The opportunistic behavior of the following firm in an optimal state of the world reduces the expected payoff of the leading firm; it creates an asymmetric allocation of risk. Therefore, in order to have at least one investing firm, the access charge that equalizes expected payoffs must equalize the return on investment of the network provider in a bad state to the profit flows of the access seeker, exactly as in the adverse-state benchmark.

Excessive high access charges are inefficient two-fold. First, from a static point of view, if access charges are linear they drive high detail prices and consequently they lower consumers' surplus. And second, they are inefficient from a dynamic point of view. If the market in question is an emerging market, excessive high detail prices today might obstruct future market development tomorrow.

Consider now the possibility of a more rich access contract between firms in the form of a commitment contract, and consider the alternative sequence of events

(0) The regulator sets the access charge but leaves open the possibility of other access contracts
(1) The leading firm rolls out the new infrastructure. The other firm decides to commit to buy access in either state of the world or to wait the next period to take an action: either bypassing the leading firm or buying access at the risk premium access charge
(2) The state of the world is revealed
(3) Both firms compete in the retail market

If the second firm does not commit we are in the previous game where access charges are at the adverse-state level. If on the other hand the firm decides to commit, because the leading firm no longer bears all the risk, both firms can negotiate a lower access charge using the same methodology used by the regulator: equalizing expected payoffs.

The expected return on investment for the leading firm is just the expected future profit flows as a network provider net of the infrastructure fixed costs. For the other firm, the expected profits are those of a network seeker. When equalizing both, the access charge is lower than the one at the adverse-state level because the leading firm can expect higher network provider profits in an optimal state.

Certainly, in a realized optimal state of the world the access seeker would have been better off by bypassing its rival. However, because the access charge that encourages the leading firm to invest can be substantially lowered, the follower might find it profitable to engage and benefit from this low access charge as its expected profits are lower than its expected profits with a high risk premium access charge.

Decreasing the access price for which the expected profit of the leader equals the expected profit of the follower, commitment contracts improve static efficiency while maintaining dynamic efficiency. The static model presented here does not account for a later duplication of the infrastructure. This is done in the second part of our paper. We illustrate the exposed above with a numerical example in the appendix.

3. Technological progress, rich access contracts and optimal timing of deployment

Contrary to the commonly accepted idea, rolling out new access networks is not only digging trenches. As a consequence, we can expect that the deployment costs will decrease over time because of technological progress. Starting from this assumption, competition for rolling-out new infrastructures can be represented by configuration of "investment rivalry"(3.1). In this framework, we show that regulators using standard linear access prices face a dilemma between improving static and dynamic efficiency (3.2). We emphasize that commitment clauses improve the situation and allow a better combination of static and dynamic efficiency (3.3). Two-part tariffs make it possible to reach the optimal first investment date with a variable part maximizing the consumers' surplus and social welfare (3.4).

3.1. Competition for rolling out new infrastructure as a configuration of investment rivalry

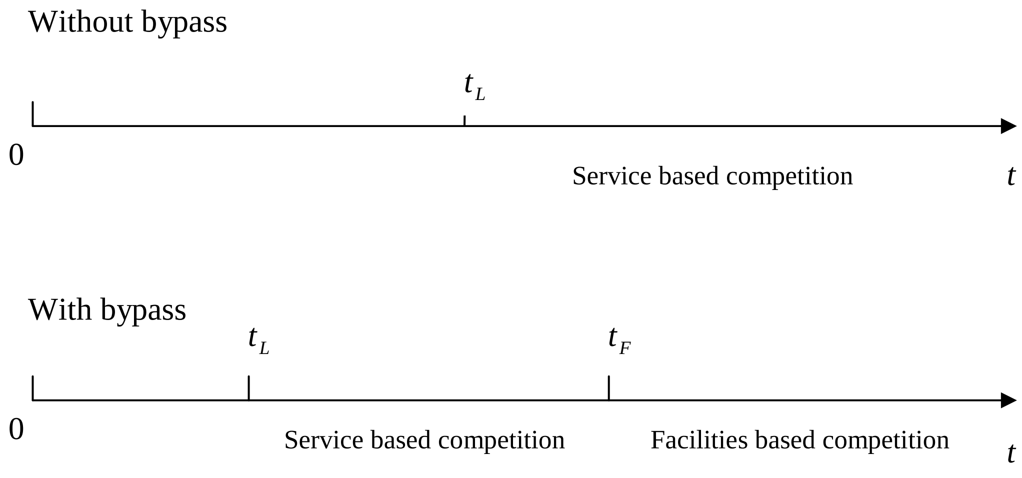
3.1.1. Basic assumptions

The origins of the concept of "investment rivalry" lie notably in Fudenberg and Tirole (1985) and Katz and Shapiro (1987). This literature formalizes market configurations where firms are competing for introducing a new product or process in a framework of exogenous technological progress. To our knowledge, the theoretical works which have applied this concept to telecommunications infrastructure investments are Gans (2001), Hori and Mizuno (2006 and 2009) and Vareda and Hoernig (2007). These models share the following basic assumptions.

There are two firms that plan to enter into the ultra broadband market. At any point in time $t \in \Re_+$, each firm can choose whether to make an irreversible investment decision. The firm that invests first is called the leader, and the firm that does not invest or invests second is called the follower. If only the leader invests, service based competition is the only possible form of competition and the leader is the access provider forever after its investment (at date t_L). If the follower also invests, the follower "bypasses" (i.e. build its own infrastructures) at date t_F. Competition will be "service-based" (SBC) during the period of time $[t_L, t_F[$ and "facility based" (FBC) after t_F. See Figure 1 for the model time line.

In this continuous-time model the Regulatory Authority mandates access if only one of the firms has invested, so there is no issue of foreclosure or denial of access. One of the regulator's objectives is to create incentives for timely investments, so, in order to avoid uncertainty for the undertakers, he sets the mandated access terms at time $t = 0$ for whoever invests first.

Figure 1: The model time line



The decision variable of each firm is its timing of investment (the "first investment date" for the leader and the "bypass date" for the follower). The optimal investment date of each firm is the one that maximizes its net present value (NPV).

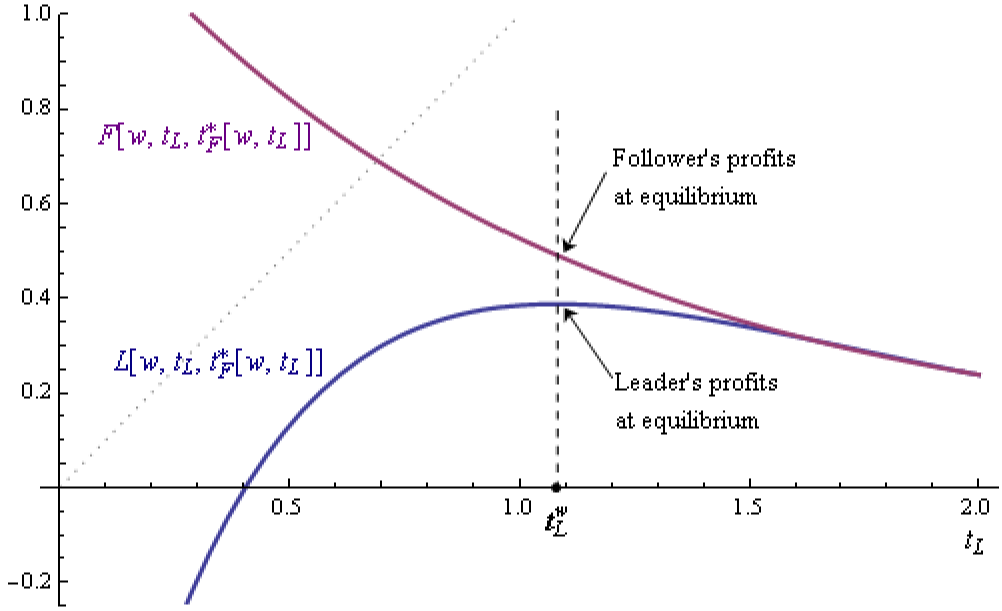
Delaying investment has conflicting effects on the NPV: on the one hand, the investment cost is declining over time because of technological progress; on the other hand, the later the firm invests, the lower is the sum of its discounted profits (investing later, the firm delays the date for which it will start to have higher profit flows because of innovation rents). As the positive effect of "delaying" dominates for "early" investment dates, whereas the negative effect prevails for "late" investment dates, there exist, for each firm, a date which maximizes its NPV.

3.1.2. The outcomes of investment rivalry: waiting and pre-emption equilibriums

Based on this framework, the literature highlighted the existence of two types of equilibrium as regards the investment date of the leader: the "waiting" and the "pre-emption" equilibrium (see Katz and Shapiro, 1987).

The first equilibrium arises when the access charge set by the regulator is low and the net discounted profit of the leader is lower than the one of the follower. This is because profit flows as a network provider are costly due to the early investment and not well remunerated. In this case, the strategy of the leader is just to delay its investment until the optimal date $t_L^w = t_L^*$ (see Figure 2 : Waiting equilibrium).

Figure 2 : Waiting equilibrium



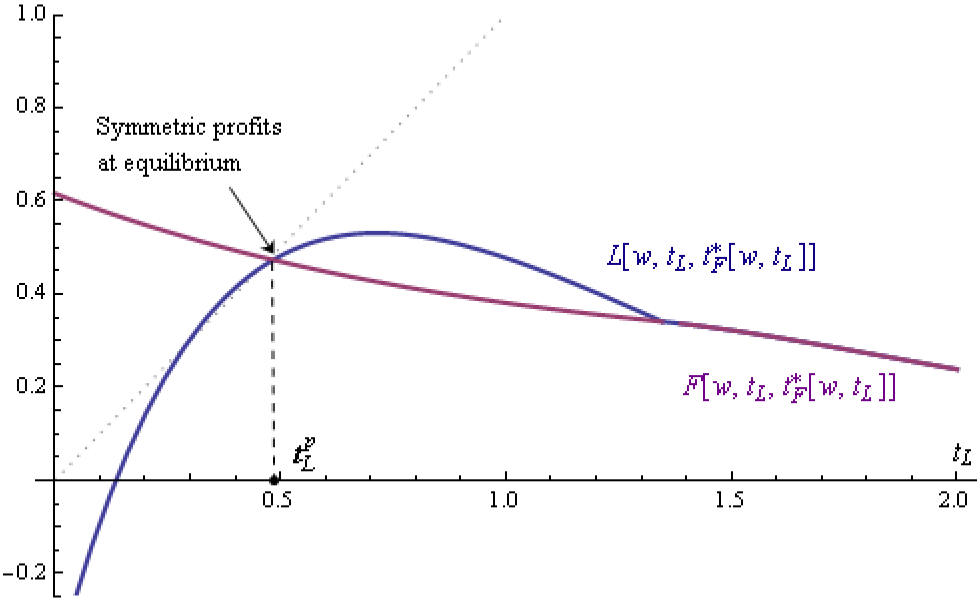
As each firm would have higher profit as a follower than as a leader, it could be argued that none of the firms will roll out new infrastructures. Nevertheless, one must keep in mind than if none of the firm invests, both of them will have lower profits. Finally, at the optimal date, the investment game can be represented as a coordination game with two Nash equilibriums - ("not investing" ; "investing") and ("investing"; "not investing") - and we just assume that one of these equilibriums will be reached.

The pre-emption equilibrium occurs when after a date t_L^p, the net discounted profits of the leader are higher than those of the follower because being a network provider is well remunerated with high access charges. In this case, firms compete for leadership and the investment will not occur at the date t_L^w but at an early date $t_L^p < t_L^w$.

When the profits of the leader are higher than the profits of the follower, investment rivalry gives rise to an "investment race": firms pre-empt each other to gain leadership. For any date after t_L^p, firm *i* would loose the race since firm *j* is willing to invest earlier. Finally, the only strategy to win the race is to invest at the first date for which the competitor is willing to pre-empt - i.e. when the strategy "being the leader" provides the same profits as "being the follower"[11](see Figure 3: Pre-emption equilibrium). This equilibrium can be compared to an auction mechanism where the highest bidder wins at a price equal to the second-highest bid.

[11] As in the previous case, there are two symmetric Nash equilibriums and is a matter of coordination to determine which firm will be the leader.

Figure 3: Pre-emption equilibrium



Note that if it can bypass, the investment date of the follower is always a waiting equilibrium: since the leader has already invested, there is no more incentive for pre-emption.

3.2. Linear access prices and the trade-off between static and dynamic efficiency

In the framework of investment rivalry, the regulator seeks to induce socially efficient timing of investment (dynamic efficiency) but also to have low retail prices, i.e. high consumers' surplus and social welfare (static efficiency). With linear access prices, these objectives are conflicting since dynamic efficiency requires high access prices whereas low access prices are better as regards static efficiency.

First of all, it must be highlighted that when the outcome of the investment game is a waiting equilibrium, the roll-out of new infrastructures always occurs too late with respect to the socially optimum timing of investment. In fact, the firms' investments induce positive externalities - they increase the consumers' surplus and generate spillovers for the competitor - but firms only consider their private return on investment.

Consequently, the only way to achieve the optimal investment date is to induce an investment race. To achieve this goal, the regulator must set high access prices to make the strategy "being the leader" more profitable and to reduce the profit earned as a follower[12]. Nevertheless, setting high access prices increases the retail prices and lessens the consumers' surplus and the social welfare. From this standpoint, with linear access prices, the regulator has to trade-off between static and dynamic efficiency.

[12] Note that the profits of the leader are not necessarily strictly increasing with the access prices. In fact, when the follower can bypass, it will do it earlier when the access price is higher. As a consequence, the leader will have higher profits during the period of SBC but the period of SBC will be shorter (see Guthrie, 2006 for a discussion). Nevertheless, there is a range of w, for which the first effect prevails (see Vareda and Hoernig, 2007).

3.3. Commitment clauses as a tool to achieve a better combination of static and dynamic efficiency

In this section we consider commitment clauses as a way to improve efficiency. Suppose that the leader and the follower can agree on an access contract that specifies the period of time that the follower uses the wholesale services of the leader - i.e. the follower commits to do not bypass before a date $t_L^* + \Delta t$. It happens that commitment clauses allow a better combination of static and dynamic efficiency since they make possible to reach the optimal first investment date with a lower linear access price. In general, there exists a continuum of "commitment contracts" for which both the profits for the leader and of the follower are raised (Saavedra, 2009).

The literature on investment rivalry emphasize that a raise of the access charge has on the follower's bypass date: a higher access charge encourages earlier infrastructure duplication[13]. This earlier bypass date affects the profits, and hence investments incentives of the leader. Even if profit flows of the leader during SBC increase with the access price, setting higher access charges reduces the SBC period[14].

It is found that requiring the follower to use the leader's wholesale services for a given period of time limits this effect. Suppose that the regulator finds optimal to induce early investments with a pre-emption equilibrium. In a pure non-cooperative setting, the earlier bypass effect would require a "high" access charge in order to increase the leader's investment incentives and attain the early first investment. However, if firms can agree on a commitment contract, the leader and the follower could instead agree on a lower access charge under the condition that the follower bypasses later.

The leader is better off because it increases total profits as it serves as network provider for a longer period. And the follower is also better off because of the extra margins it makes with the lower access charge.

As in the model of Section 2.2, commitment contracts allow lower access charges and induce a better combination of static and dynamic efficiency. Nevertheless it is important to bear in mind that FBC induces more dynamic competition and commitment contracts should have clear terms and be limited in time.

3.4. Using two-part tariffs to achieve static efficiency and induce the socially optimal first investment date

A two-part tariff is a payment of the form $T(q) = wq + f$. It consists of a variable price (*w*) and a franchise or fixed fee (*f*). In this section, we underline that two-part tariffs allow using the variable part *w* to achieve static efficiency while the fixed part *f* is used to induce the optimal first investment date. Conversely, when the access price is linear, w is used for both static and dynamic objectives.

The benefits of two-part tariffs in industries characterized by vertical relationships have been recognized for a long time. Consider a situation where both the upstream firm ("the producer") and the downstream firm ("the distributor") have some market power. They are both tempted to add a mark-up to their variable costs, which leads to excessive prices and low demand. Two-part tariffs resolve this double mark-up

[13] See Bourreau and Dogan (2005), Hori and Mizuno (2006,2009), Vareda and Hoernig (2007).
[14] See Guthrie (2006). pp. 963-964.

problem: If the distributor buys from the producer using this scheme, the producer has incentives to set the wholesale part (*w*) at marginal production costs because then the distributor sets lower prices in the final market, which increases consumption and industry profits. Then the fixed part (*f*) serves to redistribute this profit surplus between them. Two-part tariffs are efficient in two ways: they increase industry profits and they set lower prices for consumers.

The same kind of mechanism can be found in the framework of investment rivalry. As highlighted in section (3.2), with linear access prices, the regulator faces a dilemma: high prices are necessary to induce an investment race and to reach the optimal first investment date; on the other hand it implies higher retail prices and lessens the consumers' surplus and the social welfare. In other words, with linear access prices, the regulator has only one instrument to achieve two different goals (static and dynamic efficiency). Conversely, with two-part tariffs, w can be set in order to maximize the consumers' surplus and the social welfare while the investment race needed to reach the socially optimal first investment date can be induced by a fixed part f which redistributes profits from the follower towards the leader.

Consequently, two-part tariffs make it possible to achieve the first best when the follower cannot bypass. In the opposite case, they allow to induce timely investment for the leader with a variable price w maximizing the social welfare. Contrary to linear prices with commitment clauses, two-part tariffs do not just improve the combination of static and dynamic efficiency: they overcome this problem providing one instrument for static efficiency (the variable part *w*) and one instrument for dynamic efficiency (the fixed part *f*).

Nevertheless, when the follower can bypass, two-part tariffs are not enough to achieve the first best which require, in addition to static efficiency, timely investment of both the leader and the follower. In this context, the regulator could use the fixed and the variable part for dynamic objectives. However, this policy would reintroduce a trade-off between static and dynamic efficiency in setting the level of the variable part[15]. Another solution, analyzed in particular by Vareda and Hoernig (2007) is to implement simple time variant access charges such as "regulatory holidays" and "access ban". When bypass occurs too late for the (two-part) tariff inducing timely investment for the leader, the authors demonstrate that it is possible to achieve the first best using "access ban" - i.e. setting a date after which access is banned[16]. Conversely, it is possible that bypass takes place too early while the investment date of the leader is efficient[17]. In this case, regulatory holidays can improve the situation, allowing - after a period of transitory monopoly - lower access prices inducing later bypass. Nevertheless, it is not possible to reach the first best granting regulatory holidays since transitory monopoly lessens static efficiency[18]. In this case, the optimal solution may be to combine two-part tariffs and commitment clauses.

[15] See Vareda and Hoernig (2007), pp. 17-18.
[16] op. cit. pp. 19-20.
[17] Note that this case is somewhat specific since it require than the private value of the follower's investment is higher than its social value.
[18] op. cit. pp. 20-22.

Conclusion

We examined the impact of two forms of Rich Access Contracts on welfare in the framework of competition for rolling out new access network. We emphasize that commitment clauses allow a better combination of static and dynamic efficiency when there is an uncertainty on demand and in the framework of investment rivalry. In both cases, the main impact of commitment clauses it to limit opportunist behaviors of the follower (seeking access when the demand is low and bypass when the demand is high or seeking access when the investment cost is high and roll out infrastructures once it declined). It thus increases the profits gained by the leader for a given level of the access price and, consequently, it makes it possible to achieve efficient rolling out decisions with a lower access price. Moreover, there exists a "commitment contracts zone" for which profits of the leader and of the follower are raised.

In the framework of investment rivalry, the regulator always has to trade-off between encouraging timely deployment and increasing the consumers' surplus when linear access prices are implemented. Introducing two-part tariffs allows overcoming the contradiction between these two objectives.

We mainly focused, as regards dynamic efficiency, on the leader's investment date. Nevertheless, it must be underlined that in investment rivalry models where the follower can bypass, reaching the first best requires to maximize the static efficiency and that both the leader and the follower invest at the socially optimal date. From this standpoint, achieving the first best require time variant access charges or a combination of the different tools analyzed by this paper.

Appendix: An illustrative example

To illustrate the analysis of Section 2.2, we present an example based on Cournot competition. Suppose that the undertakers face an inverse demand function that is linear $p = a - bQ$, where $Q = q_1 + q_2$ is the joint demand for both firms.

Retail equilibrium with service competition. Margins over variable costs in an access duopoly are $\Pi_p = (p-c)q_L + (w-c)q_F$ for the infrastructure provider and $\Pi_s = (p-w)q_F$ for the infrastructure seeker. Where $c \geq 0$ is the variable cost for the infrastructure provider, and w is the access charge set by the regulator. At equilibrium, the leader and the follower have demands $q_L = \frac{a-2c+w}{3b}$ and $q_F = \frac{a+c-2w}{3b}$; and profits $\Pi_p[w] = \frac{(a-2c+w)^2}{9b} + \frac{(w-c)(a-2w+c)}{3b}$; and $\Pi_s[w] = \frac{(a-2w+c)^2}{9b}$.

Retail equilibrium with infrastructure competition. Suppose that when both firms roll-out their own infrastructure, the market is more dynamic and variable costs are reduced by $\varepsilon > 0$. Then, margins over variable costs for both firms are $\Pi_c = (p-(c-\varepsilon))q_i$. At equilibrium, demands for both firms are symmetric $q_c = \frac{a-(c-\varepsilon)}{3b}$, as well as margins: $\Pi_c = \frac{(a-(c-\varepsilon))^2}{3b}$

Wholesale equilibrium with infrastructure competition. The cost of investment is $I > 0$. Return on investment in an optimal state is $\theta_H \Pi_i - I$, and in an adverse state $\theta_L \Pi_i - I$, where the probability of a good state is $\mu \in [0,1]$.

Risk premium access charge such that expected profits are equalized is: $w_R = \frac{a+c}{2} + \sqrt{\frac{(a-c)^2}{4} - \frac{bI}{\theta_L}}$,

The commitment access charge is: $w_C = \frac{a+c}{2} + \sqrt{\frac{(a-c)^2}{4} - \frac{bI}{\mu\theta_H + (1-\theta)\theta_L}}$.

So for the parameters $a = 5$, $b = 1$, $c = 1$, $\theta_H = 2$, $\theta_L = 1$, $\varepsilon = 0.5$, $I = 3.5$, if the probability of having an optimal state equals the probability of having an adverse state then access charges are $w_R = 2.29$, $w_C = 1.71$ and the expected gain in profits for both firms is:

$E[L[0.5, w_C]] - E[L[0.5, w_R]] = E[F[0.5, w_C]] - E[F[0.5, w_R]] = 1.11 - 0.61 = 0.5$

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I : [confidential]

J : Freshfields – a legal assessment of the NGA Draft Recommendation

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EUROPEAN COMMISSION'S DRAFT RECOMMENDATION ON REGULATED ACCESS TO NEXT GENERATION ACCESS NETWORKS

Legal analysis under technological neutrality and related principles

Executive summary

- This note focuses on two aspects of the Draft Recommendation on regulated access to Next Generation Access Networks that raise legal concerns, namely:

  - the Draft Recommendation seeks to impose, in effect, the deployment of multiple fibre in the context of NGA network roll-out, to the detriment of mono-fibre; and

  - by mandating full unbundled access to the fibre loop irrespective of the network architecture and technology implemented, it discourages in practice the deployment of GPON technology.

- In doing so, the Draft Recommendation would violate technological neutrality, which is recognised as a key principle underpinning the EU regulatory framework for electronic communications. Indeed, technological neutrality has been implemented by the European Commission as a guiding regulatory principle across a wide range of regulatory measures, and the Draft Recommendation would thus also represent a marked departure from previous practice.

- Moreover, the current EU regulatory communications framework does not provide for a legal basis to impose the multi-fibre requirement. Indeed, NRAs arguably are precluded from adopting remedies that favour a multi-fibre network architecture.

- The multi-fibre requirement and unbundling requirement (in so far as it discourages deployment of GPON) also are disproportionate. In particular, there would appear to be less restrictive (and more suitable) means to achieving rapid deployment of NGA networks and preservation of competitive markets.

- The Draft Recommendation amounts to "regulation in disguise" in an area where NRAs are better placed to intervene, and thus also violates the subsidiarity principle.

- Finally, the Draft Recommendation's approach does not appear to be based on any objective proof that the solutions it advocates will lead to faster NGA network development and greater competition. This is contrary to the Commission's better regulation principles and to general principles of sound administration.

I. Introduction

1. On 12 June 2009, the European Commission (***Commission***) published its Draft Recommendation on regulated access to Next Generation Access Networks (***Draft Recommendation***).[19] This note focuses in particular on the following two aspects of the Draft Recommendation:

   - ***Multi-fibre requirement***. The Draft Recommendation asserts that national regulatory authorities (***NRAs***) should encourage, or, if legally possible, oblige operators with significant market power (***SMP operators***) to deploy multiple fibre in the context of their roll-out of Next Generation Access (***NGA***) networks.[20] In addition, the Draft Recommendation provides for a number of possible exemptions from regulation that apply only to multi-fibre networks.[21]

   - ***Unbundling requirement***. Further, the Draft Recommendation requires NRAs to mandate full unbundled access to the fibre loop irrespective of the network architecture and technology implemented by the SMP operator.[22] Given that one of the most common technologies used for FTTH[23] roll-out, GPON,[24] currently is not industrially available in a version that supports physical unbundling in the feeder segment as from the metropolitan point of presence (***MPoP***),[25] the Draft Recommendation in practice discourages the deployment of this specific point-to-multipoint technology, in favour of point-to-point (***P2P***) networks.

2. The purpose of this note is to analyse the Draft Recommendation from a legal perspective, focusing in particular on the conformity of the multi-fibre requirement and the unbundling requirement (in so far as it discourages deployment of GPON) with the fundamental principles underpinning the Community legal order in general, and the EU regulatory framework for

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[19] Draft Commission Recommendation on regulated access to Next Generation Access Networks (NGA), C(2009), 12 June 2009.

[20] Draft Recommendation, points 8 and 18; see also recitals 19 and 20. Point 18 makes it explicitly clear that the multi-fibre requirement relates to the terminating segment. The Commission's definition of "Multiple Fibre FTTH" as set at point 8, in conjunction with the recommendations in Annex III, appear to indicate that the Commission's multi-fibre requirement in effect also extends to the feeder segment in so far as incentives offered by the Draft Recommendation are concerned (see also footnote 3 below).

[21] Draft Recommendation, points 23 and 24, recitals 29 to 32, Annex III.

[22] Draft Recommendation, point 20; see also recital 22.

[23] Fiber to the home (***FTTH***), also called "fibre to the premises" (***FTTP***), is the installation and use of optical fibre from a central point directly to individual buildings such as residences, apartment buildings and businesses to provide unprecedented high-speed Internet access.

[24] Gigabit-capable Passive Optical Network (***GPON***) is an optical-access system based on Internet Protocol (***IP***) that allow multiple homes or businesses in a neighbourhood to share fibre from a service provider's central office.

[25] In particular, no multiplexing technology is available at this stage on the basis of which a frequency band could be allocated in a fibre per operator. In such a way, the frequency band would be dispatched all over the network up to the intended end user creating a sort of P2P within the GPON architecture without multiplying the number of fibres.

electronic communications specifically.[26] For the reasons set out below, this note concludes that the Draft Recommendation would appear to violate, in various ways:

- the principle of technological neutrality and the provisions of the EU regulatory framework;
- the proportionality principle; and
- the principles of subsidiarity and sincere cooperation with Member States.

II. The Draft Recommendation assessed under the technological neutrality principle

Technological neutrality is a key principle underpinning the EU regulatory framework for electronic communications

3. The principle of technological neutrality underpins the EU regulatory framework for electronic communications. Technological neutrality was formally adopted by the Commission as a regulatory principle in its 1999 Communications Review as one of five key principles that would define the EU regulatory framework on electronic communications, which has been in force since 2002 and is currently under review. According to the text of the 1999 Communications Review, technological neutrality means that:

   "*legislation should define the objectives to be achieved, and should neither impose, nor discriminate in favour of, the use of a particular type of technology to achieve those objectives*".[27]

4. The principle thus covers two aspects:

   - ***Prohibition on imposing a particular technology***. Technological neutrality prohibits regulation that would eliminate the evolutionary selection function of the market mechanism. It implies that regulation may not pre-empt market outcomes: it is the market rather than governmental institutions or authorities that should decide about the success or failure of technologies.
   - ***Prohibition on discriminating against a particular technology***. Technological neutrality also prohibits favouring the use of one particular type of technology over another. A technology can be understood as a method to turn inputs into outputs, which competes for these inputs against other technologies. The technological neutrality principle, by ensuring a fair competition for inputs, protects the rights of those who own and/or those who wish to use a particular type of technology.

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[26] To that effect, this note will highlight a number of factual, technological and economic flaws in the Commission's Draft Recommendation. For a full overview of these, see "France Telecom's response to the public consultation of the European Commission on a draft Recommendation on regulated access to Next Generation Access Networks (NGA), July 2009", which forms the factual basis of this note.

[27] Towards a new framework for Electronic Communications infrastructure and associated services. The 1999 Communications Review, COM(1999)539.

5. The principle of technological neutrality is laid down in Article 8 of the Framework Directive[28] which provides that:

"*Member States shall ensure that in carrying out the regulatory tasks specified in this Directive and the Specific Directives, in particular those designed to ensure effective competition, national regulatory authorities take the utmost account of the desirability of making regulations technologically neutral*".[29]

6. As such, technological neutrality is an emanation of the general EU law principles of non-discrimination and protection of undistorted competition in the common market. The Commission refers to it as "*one of the most fundamental principles of the EU telecoms rules*".[30]

7. Also, the current EU regulatory framework strictly delineates the regulatory remedies which NRAs may impose. In line with the principle of technological neutrality, the list of remedies available to NRAs does not provide for any competence for NRAs to impose remedies on SMP operators that favour a certain technology.[31] Operators are thus fundamentally free to decide which technology they wish to use or network topology they wish to adopt.

8. At Member State level, the principle is also reflected in national legislation governing the electronic communications sector.[32]

9. The current proposals for a revision of the EU communications regulatory framework further reinforce the requirement of safeguarding technological neutrality:

"… *Member States shall take the utmost account of the desirability of making regulations technologically neutral and shall ensure that, in carrying out the regulatory tasks specified in this Directive and the Specific Directives, in*

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[28] Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications, OJ L 108/33 (***Framework Directive***). See also recital 18.

[29] The text of Article 8 of the Framework Directive, headed "*Policy objectives and regulatory principles*", confirms that technological neutrality is a regulatory *principle* rather than a policy *objective*. Under paragraph 1 it is stated that the policy objectives underlying the Framework are set out in paragraphs 2, 3 and 4. Technological neutrality, however, is only found in paragraph 1 of Article 8. See van der Haar, *Technological Neutrality: What does it Entail?,* TILEC Discussion Paper, March 2007.

[30] MEMO/08/620, Telecoms: the 'Article 7' procedure and the role of the Commission – Frequently Asked Questions.

[31] See Articles 9 to 13 of Directive 2002/19/EC of the European Parliament and of the Council of 7 March 2002 on access to, and interconnection of, electronic communications networks and associated facilities (***Access Directive***). For example, under Article 9 of the Access Directive, SMP operators may be mandated to publicise specified information such as network characteristics, but not to roll-out a network with certain characteristics.

[32] For example, the European Court of Justice (***ECJ***) has acknowledged ensuring technological neutrality as an aim of national electronic communications legislation in Case C-227/07, *Commission v. Poland*, at para. 13.

particular those designed to ensure effective competition, national regulatory authorities do likewise".[33]

10. The proposals further confirm that avoiding undue limitations on the principle of technological neutrality entails preventing "detailed constraints on network architecture".[34] This illustrates that the neutrality principle applies to "technologies" in the broad sense (e.g., different platforms, network types, deployment models, topologies or architectures).

11. In sum, the regulatory principle of technological neutrality, as enshrined in EU legislation, prohibits both the imposition of a particular type of technology and the favouring of one type of technology over another.[35] The term technological neutrality is interpreted widely and thus also covers neutrality with respect to network architectures.

Application of the technological neutrality principle as a guiding regulatory principle in the electronic communications sector

12. The concept that EU policy is not intended to "pick winners and losers" among competing technologies has been implemented as a guiding regulatory principle across a wide range of regulatory measures in the electronic communications sector and beyond.[36]

<u>Regulatory remedies</u>

13. Technological neutrality is a guiding principle for defining regulatory remedies under the EU regulatory framework for electronic communications. It is intended to ensure that no particular technological solution is artificially stimulated or penalised through regulatory intervention. For example:

- Under the Article 7 procedure, the Commission consistently requires NRAs to define markets in a forward-looking manner according to competition law, "*taking utmost account of the principle of technology neutrality*".[37]

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[33] See: European Parliament legislative resolution of 6 May 2009 on the Council common position for adopting a directive of the European Parliament and of the Council amending Directives 2002/21/EC on a common regulatory framework for electronic communications networks and services, 2002/19/EC on access to, and interconnection of, electronic communications networks and associated facilities, and 2002/20/EC on the authorisation of electronic communications networks and services (16496/1/2008 – C6-0066/2009 – 2007/0247(COD)).

[34] Amended proposal for a Directive of the European Parliament and of the Council amending Directives 2002/21/EC on a common regulatory framework for electronic communications networks and services, 2002/19/EC on access to, and interconnection of, electronic communications networks and services, and 2002/20/EC on the authorisation of electronic communications networks and services, 2008/11/6. This example relates to the Directive on radio equipment and telecommunications terminal equipment.

[35] See Kamecke, *Technologieneutrale Regulierung*, Ch.2.1.1, p.7 f; Körber, Der Grundsatz der Technologieneutralität, p.11.

[36] Technological neutrality also has been applied more recently to other areas of EU law such as consumer protection and environmental laws.

[37] See, for example, Case CY/2006/0334 where the Commission reminded the Cypriot NRA (OCECPR) that market definition (relating to 2G and 3G mobile telephony) should be technology-neutral, i.e. based

- In relation specifically to market definition for NGA networks, the Commission has recognised – with reference to the technological neutrality principle – that in addition to FTTC and FFTH, some NGA models "*will result in a completely different local network architecture*". Thus, the Commission has accepted that different types of NGA networks may emerge.[38]

- Further, in a procedure under Article 7 of the Framework Directive concerning wholesale broadband access in the Czech Republic, the Commission recalled that "*when determining the appropriate access level to be mandated, the NRAs must balance the technical and operational conditions resulting from the incumbent's network architecture with the level of competition in the market*".[39] In other words, in identifying remedies NRAs must always perform a concrete analysis based on both the relevant network architecture and competitive conditions on the market (rather than directly or indirectly mandating a specific network architecture without regard to overall market circumstances).

Government aid in the communications sector

14. The Commission's approach to government funding in the communications sector has traditionally also reflected a technologically neutral approach. For example:

    - In relation to structural funds in support of electronic communications, the selection criteria for investment in infrastructure must adhere to the principle of technological neutrality: European Regional Development Fund support "*should not a priori favour any particular technology, nor limit the technology choice of the region*".[40]

    - Application of the EU state aid rules in the field of *public broadband funding* measures and public support measures for the *digital switchover* in recent years shows that the Commission will not accept that a Member State, in providing public funding, imposes any technology upfront or favours one technology over another. For example, the Commission's Communication on "Bridging the Broadband Gap", which deals specifically with the development of broadband networks and services, refers to

on the nature of the products or services provided, not on the technological platform used to provide them.

[38] Explanatory Note – Accompanying document to the Commission Recommendation on Relevant Product and Service Markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services (C (2007) 5406).

[39] Case CZ/2006/0449.

[40] Commission Staff Working Paper, Guidelines on criteria and modalities of implementation of structural funds in support of electronic communications, SEC (2003) 895, p. 9. See Alexiadis and Cole, *The concept of technology neutrality and the new ECNS regulatory framework*, ECTA review, p. 76.

technological neutrality as one of the key principles Member States must take into account in any public funding measures.[41]

- Further, in its state aid decision-making practice, the Commission has consistently held that any public funding measure unduly favouring one technology over another would not be eligible for clearance under Article 87(3) of the EC Treaty.[42]

- However, the Commission's recent Broadband State Aid Communication[43] favours multi-fibre architecture, and is therefore subject to the same criticisms as the Draft Recommendation (see below).

The approach of the Draft Recommendation is at odds with the principle of technological neutrality

15. From a review of the Draft Recommendation, the Commission's approach does not appear to be based on hard evidence that the solutions advocated by the Draft Recommendation will lead to faster NGA network development and greater competition. The Draft Recommendation makes statements about the perceived advantages of multi-fibre over other roll-out scenarios, without referring to economic analysis and/or factual evidence.

16. Hence, the Commission seems to favour an untested network architecture, which is also regarded as considerably more expensive, without any justification or in-depth analysis that it would be better suited to meet the objectives to be achieved by regulatory intervention and indeed disregarding the fact that mono-fibre may actually be more suitable to achieve a rapid NGA network deployment whilst preserving competition. This appears to be contrary to the Commission's "better regulation" principles[44] and to general principles of sound administration.[45]

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[41] Commission Communication "Bridging the Broadband Gap", COM(2006) 129 final, 20 March 2006, p. 9.

[42] See in the area of broadband network funding, e.g. Case N 282/2003, *United Kingdom – Cumbria Broadband – Project Access – Advancing Communication for Cumbria and Enabling Sustainable Services*, Commission Decision of 10 December 2003, O.J. 2004 C16/23 and Case N 307/2004, *United Kingdom - Broadband in Scotland-remote and rural areas,* Commission Decision of 16 November 2004, O.J. 2005 C126/11. See in the area of the digital switchover, Case C 52/2005, *On the state aid implemented by the Italian Republic for the subsidised purchase of digital decoders*, Commission decision of 24 January 2007, O.J. 2007 L147/1; Case N 270/2006, *Italy – Subsidies to digital decoders with open API*, Commission decision of 24 January 2007, O.J. 2007 C80/3; Case N 107/2007, *Italy – Subsidy for iDTV and digital decoders*, Commission decision of 27 June 2007, O.J. 2007 C246/2. In the recent *Mediaset* case, the Commission equally advocated application of the technological neutrality principle (see Report for the Hearing in Case T-177/07).

[43] Community Guidelines for the application of State aid rules in relation to rapid deployment of broadband networks, para. 74.

[44] One of the fundamental better regulation principles is that any proposed action should not go beyond what is necessary to achieve the policy objectives pursued. See the Commission Communication "Implementing the Community Lisbon programme: A strategy for the simplification of the regulatory environment", Brussels, COM(2005) 535 final.

[45] The Community Courts have ruled that the principles of sound administration imply that the Community institutions must adopt "*the behaviour of an administrative authority exercising ordinary*

Analysis of the multi-fibre requirement in view of the principle of technological neutrality

17. The Draft Recommendation in effect seeks to impose the deployment of multiple fibre in the context of NGA network roll-out. Indeed, according to the Commission, NRAs should encourage, or, if legally possible, oblige SMP operators to deploy multi-fibre. In addition, the Draft Recommendation suggests a number of possible exemptions from regulation that apply only where multi-fibre networks are being deployed. As the deployment of multiple fibre line supports both P2P and point-to-multipoint topologies, the Commission claims it remains "*technology neutral*".[46] However, for the reasons discussed below this assertion is difficult to sustain.

18. ***The Draft Recommendation effectively imposes a multi-fibre network architecture***. As mentioned, the Draft Recommendation in effect imposes (directly and indirectly) the deployment of multi-fibre. Contrary to its established practice, the Commission thus mandates a specific network architecture, which seems to run counter to its obligation (and the obligation of NRAs) to take the "*utmost account*" of the technology neutrality principle, which is a fundamental principle at the heart of the EU regulatory framework[47] and also entails preventing "*detailed constraints on network architecture*".[48]

19. ***The multi-fibre requirement also runs counter to the Commission's own previous application of technological neutrality***. The approach of the Draft Recommendation to favour (and indeed impose) multi-fibre architecture is contrary to the Commission's own application of technological neutrality in relation to NGA networks in the past. As discussed above, the Commission has previously recognised the inherent diversity of possible network architectures that are suitable for NGA networks deployment, and required a concrete analysis based on both the relevant network architecture and competitive conditions on the market as a prerequisite for any regulatory intervention in NGA networks.[49] In contrast, the Draft Recommendation mandates a specific network architecture (to the effective exclusion of others) without an adequate assessment of the possibility offered by existing alternatives.

20. ***NRAs are precluded from adopting remedies that favour a multi-fibre network architecture***. As set out above, under the Access Directive, NRAs are empowered to impose only those regulatory remedies identified in its Articles 9 to 13 or, in exceptional circumstances, "*other obligations for access or*

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care and diligence" and must "*examine carefully and impartially all the relevant aspects of an individual case*". See Case T-178/98, *Fresh Marine*, [2000] ECR-II 3331, para. 82 and Case C-269/90, *Technische Universitat Munchen v. Hauptzollamt Munchen-Mitte* [1991] E.C.R. I-5469, para.14.

[46] Draft Recommendation, recital 19.

[47] Article 8 of the Framework Directive.

[48] Amended proposal for a Directive of the European Parliament and of the Council amending Directives 2002/21/EC on a common regulatory framework for electronic communications networks and services, 2002/19/EC on access to, and interconnection of, electronic communications networks and services, and 2002/20/EC on the authorisation of electronic communications networks and services, 2008/11/6. This example relates to the Directive on radio equipment and telecommunications terminal equipment.

[49] See the document referred to in footnote 20.

interconnection".[50] Recital 14 of the Access Directive, clearly confirms that the range of possible remedies under Article 9 to 13 are a set of *"maximum obligations"* that can be applied to undertakings "*in order to avoid over-regulation"*. Paragraph 116 of the Commission's Guidelines on market analysis and the assessment of significant market power (***SMP Guidelines***)[51] further confirms that NRAs "*will have to choose between the range of regulatory obligations set out in the Directives in order to remedy a particular problem in a market found not to be effectively competitive*".

21. The provisions of the Access Directive do not provide for a legal basis allowing NRAs to *impose* (or even *favour*) a certain technology or architecture. On the contrary, in line with the principle of technology neutrality, the regulatory framework only provides for the possibility for NRAs to impose remedies that take the existing technology or network architecture as deployed by operators as a given and to apply such remedies as may be required. Indeed, the EU legislator clearly did not envisage NRAs getting involved in engineering the roll-out of appropriate technologies or architectures.

22. Under the current regulatory framework, NRAs are thus precluded from imposing (or favouring) multi-fibre, whether directly or through the use of remedies. Instead, they should (be allowed to) take such architectures (whether multi-fibre or mono-fibre) that market players decide to deploy as a starting point for their assessment, and assess on the basis of all relevant circumstances whether any of the available regulatory remedies might be required.

<u>Analysis of the unbundling requirement in view of the principle of technological neutrality</u>

23. By imposing unbundling of fibre in the feeder segment, the Draft Recommendation in effect creates a barrier to the deployment of GPON technology, which is one of the most common and proven technologies used for FTTH roll-out. GPON unbundling, comparable to copper unbundling, is not yet industrially available (and is not expected to be so in the next couple of years). Other forms of "unbundling" could be imagined however based on passive access to dark fibre for example. Thus, depending on what is understood with unbundling, the Draft Recommendation could in practice discourage the deployment of this specific point-to-multipoint technology, in favour of P2P.

24. ***The unbundling requirement discriminates against GPON technology***. To the extent the Draft Recommendation would require unbundling in the feeder segment, similar to copper unbundling, the Draft Recommendation discriminates against GPON technology, to the benefit of P2P technologies. It

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[50] Article 8(3) of the Access Directive allows NRAs in exceptional circumstances to impose additional remedies (subject to the Commission's approval): it follows from the structure of the regulatory framework that such remedies should always respect the principle of technological neutrality. Moreover, such remedies always must relate to "*access and interconnection*", i.e. not to choice of network technology but to ways of accessing/connecting to networks.

[51] Commission Guidelines of 11 July 2002 on market analysis and the assessment of significant market power under the Community regulatory framework for electronic communications networks and services, OJ C 165/6.

thus would appear to distort the level playing field both between equipment manufacturers and between network operators or even amount to picking a "winning technology", which is clearly contrary to technological neutrality and to the Commission's application of that principle in other situations.

III. The Draft Recommendation assessed under the proportionality principle

The proportionality principle

25. Article 8(4) of the Access Directive provides that any remedies imposed on SMP operators should be proportionate and justified in the light of the objectives of the EU communications regulatory framework. The proportionality principle is also one of the fundamental general guiding principles for any administrative action in the EU.[52] It is enshrined in Article 5(3) of the EC Treaty which provides that any actions by the Community shall not go beyond what is necessary to achieve the objectives of the Treaty.

26. According to established ECJ case law, on the basis of the proportionality principle any Community measure must be: (i) *suitable* to achieve its objective; (ii) *necessary* to achieve that objective; and (iii) there should be *no other less restrictive means* to achieve the objective.[53]

The Draft Recommendation arguably prescribes disproportionate measures

27. The Draft Recommendation's key objectives are the rapid deployment of NGA networks, while preserving competitive markets. However, the multi-fibre requirement and unbundling requirement (in so far as it discourages deployment of GPON) would appear to be disproportionate means to achieve these objectives.

<u>Analysis of the the multi-fibre requirement in view of the proportionality principle</u>

28. First, the bias towards multi-fibre does not appear to be *suitable*, as it risks in practice delaying NGA network deployment in the EU, given the resulting uncertainty as regards other NGA roll-out models which may stifle further investments. The multi-fibre architecture favoured by the Draft Recommendation still needs to prove its suitability in practice.

29. Moreover, the multi-fibre requirement is not suitable, in so far as it may very well result in inefficiencies. The Draft Recommendation asserts that "*networks based on multiple fibre lines can be deployed at a marginally higher cost than single fibre networks*".[54] However, actual field studies in France suggest that this assertion disregards a number of inefficiencies and additional costs which

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[52] See Case C-331/88, *R. v Ministry of Agriculture, Fisheries and Food Ex p. Fédération européenne de la santé animale (FEDESA)*, [1990] E.C.R. I-4023.

[53] See Case 66/82, *Fromançais v Forma*, [1983] ECR 395, para 8 and Case 47/86, *Roquette Frères v ONIC*, [1987] ECR 2889, para 19.

[54] Draft Recommendation, recital 19.

result from the deployment of multiple fibre NGA networks (compared to mono-fibre networks).[55]

30. Second, experience in many countries shows that deploying multi-fibre is not *necessary* to ensure the deployment of NGA networks. The Draft Recommendation disregards other deployment models without any justification, whereas other solutions may ensure more rapid and cost-efficient NGA network deployment. Mono-fibre is such a rapid and cost efficient solution. Mono-fibre can also be unbundled in the terminating segment for the purposes of granting access, meaning it provides an adequate alternative to avoiding the emergence of new bottlenecks and ensuring the roll-out of NGA networks does not lead to reduced competition. The bias towards a multi-fibre approach would appear not to be justified by the protection of "*long-term sustainable competition*"[56] as this objective can equally be reached on the basis of mono-fibre networks.

31. It is also relevant in this regard that the Commission, in its impact assessment carried out before the adoption of the proposals for a new EU regulatory framework, has detected no need to impose a multi-fibre requirement in an NGA context.[57] In this impact assessment, the Commission stated that, with respect to the development of NGA networks, an extensive investigation into technological and market developments had indicated that the existing approach was fundamentally sound. It did not refer to the need for the imposition of a multi-fibre requirement (or an unbundling requirement) in order to safeguard the development of such networks.

32. It can also be noted in this regard that the Draft Recommendation provides for a less interventionist approach in the area of, for example, the provisions in relation to co-investment. In contrast, it provides for no clear justification why an interventionist approach in the area of multi-fibre deployment is necessary. NRAs are capable of assessing which approach is appropriate in light of the specific national or even regional circumstances in order to ensure rapid and cost-effective NGA network deployment. A mandatory multi-fibre approach is not necessary in that regard.

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[55] See, for a detailed overview of the costs incurred in various deployment scenarios, France Telecom's response to the public consultation of the European Commission on a draft Recommendation on regulated access to Next Generation Access Networks (NGA), July 2009. In a nutshell, the cost incurred for the deployment of multi-fibre lines on the terminal segment (which represents 60% of the overall investment for FTTH deployment) is estimated to be at least 40% higher than the cost for the mono-fibre line option. These extra costs relate to: (i) the need to use bigger cables; (ii) the need to install more router or connecting equipment; and (iii) increased soldering works and the separation of the fibres in the building at the distribution point.

[56] Draft Recommendation, recital 19.

[57] Commission Staff Working Document SEC(2007) 1472/3: Impact assessment – Accompanying document to: (i) the Commission proposal for a Directive of the European Parliament and the Council amending European Parliament and Council Directives 2002/19/EC, 2002/20/EC and 202/21/EC: (ii) Commission proposal for a Directive of the European Parliament and the Council amending European Parliament and Council Directives 2002/22/EC and 2002/58/EC; and (iii) Commission proposal for a Regulation of the European Parliament and the Council establishing the European Electronic Communications Markets Authority, {COM(2007)697, COM(2007)698, COM(2007)699, SEC(2007)1473}, see page 48.

33. In turn, the above suggests that there would appear to be *less restrictive means* to ensure the Draft Recommendation's objectives.

Analysis of the unbundling requirement in view of the proportionality principle

34. The potential *de facto* restriction of GPON deployment which could result from an unbundling requirement (similar to copper unbundling) is arguably also not *suitable*, as this could lead to the exclusion of a technology that represents several advantages for NGA network deployment, reducing choice and innovation and stifling network competition.

35. A GPON network differs from a P2P network in that it only uses one fibre to connect multiple households. This fibre is shared by users instead of being dedicated to one single household. Expert studies are indicating that the cost per connection in dense areas is higher for P2P than GPON.[58] Moreover, the overall cost for several (competing) GPON networks is equal to or only marginally higher than the development of a single P2P network in dense areas. This would demonstrate that GPON is a key enabler for network competition and may very well be suitable to achieve the aims of the Draft Recommendation namely the fast roll-out of NGA networks.[59]

36. The unbundling requirement also may risk reducing investment in GPON technology and related R&D, as, if implemented, it would render the use of this technology incompatible with regulatory requirements. It would also slow down the deployment of GPON-based networks.

37. In fact, the unbundling requirement (which may affect the use and availability of GPON) may not even be *necessary* to preserve competition. On the contrary, a deployment based on GPON would equally promote competition at an infrastructure level. Alternative operators could, for example, install their own GPON lines, especially in dense areas where infrastructure competition is possible. If considered necessary, regulated access to ducts where these are available, could further stimulate this.

38. The above suggests that there are *less restrictive means* to ensure the Draft Recommendation's objectives than through an absolute requirement for unbundling (which leads to the exclusion an important technology).

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[58] See for an extensive analysis of P2P/GPON deployment costs, the study carried out by Analysis Mason, which is contained in annex to France Telecom's response to the public consultation of the European Commission on a draft Recommendation on regulated access to Next Generation Access Networks (NGA), July 2009.

[59] Building several P2P networks would not be possible not only because of the higher costs resulting from active equipment and fibre optic cables but also in view of additional civil engineering works required to host multiple P2P networks. See, for further details: France Telecom's response to the public consultation of the European Commission on a draft Recommendation on regulated access to Next Generation Access Networks (NGA), July 2009.

IV. The Draft Recommendation violates the principles of subsidiarity and sincere cooperation

The subsidiarity principle

39. The principle of subsidiarity (Article 5 of the EC Treaty) provides that:

> " *[…] the Union shall act only if and in so far as the objectives of the proposed action cannot be sufficiently achieved by the Member States, either at central level or at regional and local level, but can rather, by reason of the scale or effects of the proposed action, be better achieved at Union level*".

40. The principle of subsidiarity thus constitutes a limitation on the exercise of the Commission's competence and entails a presumption that unless proven otherwise Member States are better placed to act.

The prescriptive approach of the Draft Recommendation is at odds with subsidiarity

41. Under Article 7 of the Framework Directive, NRAs are given the competence to define the boundaries of relevant markets in accordance with competition law principles, to conduct market analysis and impose remedies. Reflecting the subsidiarity principle, they are considered to be better placed to assess local markets and ascertain when regulatory intervention is required.

42. In the area of NGA networks, it should therefore be for NRAs to analyse markets and decide whether to impose remedies or exempt specific situations from regulation without being bound by a predetermined technological outcome. However, the Draft Recommendation appears to bypass the role of NRAs, steering markets towards specific technologies without considering local requirements and circumstances. The Draft Recommendation's prescriptive approach thus would risk curtailing the competences of NRAs as foreseen in the Framework Directive.

43. Moreover, the Commission's use of a recommendation to prescribe remedies regarding the nature of infrastructure deployment appears to be at odds with Article 19 of the Framework Directive. This provision states that the Commission may issue recommendations on the harmonised application of the provisions in the directives of the EU regulatory framework and that Member States must ensure that NRAs take the utmost account of those.

44. However, harmonised remedies regarding the nature of infrastructure deployment have not been foreseen in any provisions of the EU regulatory framework and the Commission thus cannot issue recommendations to Member States on that basis (let alone that NRAs would be obliged to take account of such recommendations).[60]

45. Finally, the text of the Draft Recommendation as proposed by the Commission is inconsistent with ECJ case law. According to that case law, recommendations

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[60] The Commission thus arguably does not have any competence to impose the recommendation in its current format, since it by far exceeds its implementing powers provided for in Article 19 of the Framework Directive.

are "*measures which, even as regards the persons to whom they are addressed, are not intended to produce legal effects*" and "*generally adopted by the institutions of the Community when they do not have the power under the EC Treaty to adopt binding measures*" (Case C-322/88, *Grimaldi*). However, the draft Recommendation in effects seeks to regulate NGA networks in a binding manner throughout the EU, in an area where there is no legal basis for Commission action, thus bypassing NRA competences.

46. The Draft Recommendation thus could be qualified as "regulation in disguise" in an area where not only NRAs are better placed to intervene, but the Commission also lacks competence to impose market outcomes.

The Draft Recommendation and the Commission's duty of sincere cooperation with Member States

47. Finally, the Draft Recommendation puts Member States/NRAs in a position whereby, if they follow its directions, they may have no choice but to violate the principle of technological neutrality.

48. However, the compulsory language of Article 8 of the Framework Directive (i.e., Member States "*shall ensure*" that NRAs take the utmost account of technological neutrality) implies that there is an obligation for Member States to ensure that the technological neutrality principle is respected. The Framework Directive thus leaves no margin of discretion for Member States to allow NRAs to impose or favour certain technologies but requires them to perform an in-depth factual assessment of every case.

49. In turn, the principle of sincere cooperation (Article 10 of the EC Treaty) implies that the Commission (and other EU Institutions) should not put Member States/NRAs in a position where they are forced to violate technological neutrality.[61]

50. Moreover, Article 10 prohibits any measure, such as the Draft Recommendation, that could jeopardise the attainment of the objectives of the EC Treaty, which include the principles of non-discrimination and undistorted competition that are at the basis of the technological neutrality principle.

V. Conclusion

51. It follows from the above that the multi-fibre requirement and unbundling requirement (in so far as the form of unbundling that is mandated precludes or restricts deployment of GPON) would violate the Community law principles of technological neutrality, proportionality and subsidiarity. Moreover, the current EU regulatory communications framework does not provide for a legal basis to impose the multi-fibre requirement as proposed.

52. At any rate, the Commission's approach does not appear to be based on any objective proof that the solutions advocated by the Draft Recommendation will

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[61] Article 10 EC Treaty puts the Commission under a duty to cooperate in good faith with institutions of Member States responsible for implementing Community law. ECJ, Case C-251/89, *Athanasopouls*, [1991] ECR, I-2797.

lead to faster NGA network development and greater competition. This is contrary to the Commission's better regulation principles and to general principles of sound administration.

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