Body of European Regulators for Electronic Communications

BEREC

BoR (11) 65

BEREC response to the Commission's Questionnaire on costing methodologies for key wholesale access prices in electronic communications

9 December 2011

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Introductory remarks

Question 1 Problem definition

BEREC welcomes the opportunity to respond to the Commission's consultation questionnaire on "*Costing methodologies for key wholesale access prices in electronic communications*" ("Consultation"). BEREC agrees with the Commission that the transition from legacy towards next generation access ("NGA") networks is a regulatory challenge, which makes it a useful moment to look at regulatory issues and costing methodologies.

Regarding Question 1, BEREC wants to make the following general points, which will be further elaborated in this section:

1) Applying the fundamental principles of the regulatory framework - including, where appropriate, the implementation of a proper cost-oriented wholesale access price - promotes effective competition, provides the right incentives to invest and facilitates the transition towards NGA.

2) Regulation needs to be technologically neutral to create a level playing field between (potentially) competing platforms.

3) Regulatory consistency over time and along the value chain within member states matters most for entry and investment decisions, rather than price divergences across European countries.

4) It is important not to lose sight of the demand-side impact (for example, not lose sight of what the market will bear and the impact on consumers) and not force too many objectives onto the regulatory framework for addressing SMP in wholesale access markets.

5) The investment incentives of both incumbents and entrants are shaped by the stability of the regulatory regime. If the regulatory regime provides scope for 'gaming' by either incumbents or entrants (or if regulators are seen to expropriate sunk investments by incumbents or entrants), this will not facilitate effective competition or foster efficient investment, ultimately to the detriment of consumers.

1. Principles of the framework

BEREC is of the opinion that following the fundamental principles of the regulatory framework, namely promoting effective competition and regulatory predictability for the benefit of the European citizens, and implementing a proper cost-oriented wholesale access price regulation is the best way to facilitate the transition towards NGA. As competition is the best driver for efficient investment, the best way to incentivise efficient investment in markets susceptible to ex-ante regulation[1] is a regulatory approach that promotes effective competition

[1] Taking account of other public bodies/policies (such as public funding/state aid), but it needs to be pointed out that there may sometimes be tensions.

through the application of the regulatory instruments, namely non-discriminatory access usually coupled with price control obligations and cost orientation.[2]

The ladder of investment principle links the two goals of promoting effective competition and efficient investment as it says that – through access regulation with a consistent approach to cost-oriented pricing – competition is promoted, because competitors are enabled through a chain of access products to invest in a step-by-step manner. That is, the two goals should be mutually reinforcing (competition drives investment and investment promotes competition). Previous BEREC reports have pointed out that the ladder of investment principle can be transferred to an NGA environment.[3] Furthermore there is also a virtuous circle as competition pushes service diffusion which in turn boosts investments which would be expected to facilitate the reaching of the 2020 targets.

BEREC therefore stresses the importance of following the fundamental principles of market liberalisation to promote effective competition and efficient investment through economic regulation setting incentives for economically rational behaviour by all market players. Weakening these principles would risk creating legal as well as regulatory uncertainty which should be avoided by all means in a situation where regulatory predictability is crucial to win investors' confidence.

2. Technological neutrality

BEREC underlines that fibre is not the only infrastructure to fulfil the DAE targets. Following the principle of technological neutrality other infrastructures need to be recognised as well and regulation should avoid creating an unlevel "playing field" between potentially competing platforms and/or avoid trying to pick "winners" or cut off technological options (no NRA can know today with certainty the efficient technology in the long run). The DAE targets can be achieved through a combination of fixed and wireless technologies, particularly for the more rural parts of Europe.

BEREC would like to add that incumbent operators are not the only ones to invest in NGA infrastructure. Competitors' investment (both of alternative operators using unbundling as well as cable, mobile and other network operators investing in broadband networks) are also vital in reaching the DAE targets. Not sufficiently taking into account the latter would risk compromising the well-established approach of the European regulatory framework to promote infrastructure competition where feasible.

3. Regulatory consistency

In markets such as wholesale access markets which are national – or in an NGA environment potentially even sub-national – by nature consistency over time and along the value chain matters more for entry and investment decisions than price divergences across European countries. BEREC acknowledges that regulators should apply consistent principles for setting prices, but BEREC submits that overall this is the case. As the latest BEREC Report on Regulatory Accounting in Practice[4] shows the majority of NRAs apply a combination of CCA/LRIC to set cost-oriented wholesale access prices. Even when using consistent principles, prices may differ due to real underlying cost differences (e.g. differences in labour and civil engineering costs, population density and dispersion, economies of scale, density and scope in different Member States).

[2] In line with the NGA Recommendation (2010/572/EU) this usually implies cost-orientation (Recommend 25 and 35), but leaves room for other price control measures. See also below Q3-Q7.
[3] Cf. ERG/BEREC NGA reports: ERG (09) 17 – NGA Economic Analysis and Regulatory Principles; BoR (10) 08 – NGA Wholesale Access Products; BoR (11) 06 – NGA Report; and BoR (11) 43 – BEREC report on the Implementation of the NGA Recommendation.
[4] BoR (11) 34, October 2011

BEREC challenges that different wholesale access prices are mainly due to the divergent implementations of costing methodologies by NRAs.[5] Up to 80% of access network costs stem from civil engineering costs which are different due to, for example, different geographies and topologies etc. It follows that the cost (and price) differences are explainable to the biggest part by these structural factors and not the choice of a particular costing methodology by an NRA. For these reasons BEREC is not convinced that a different implementation of costing methodologies by regulators when setting wholesale access prices would pose a primary problem for any (cross-border) investor or creates barriers to the internal market or the fulfilment of the DAE targets. Time consistent and predictable application of regulation (of price control measures and non-discriminatory access) in SMP markets are key for the investor decisions on where to invest.

BEREC considers that even in the case of all NRAs implementing the same costing methodology, it is doubtful that this would lead to similar outcomes in terms of wholesale access prices. First, as noted above, there are relevant structural differences between countries. Secondly, due to different slopes in the investment series of the national incumbents in terms of civil engineering and copper cables across Europe, the general adoption of or switch to an historical asset base approach across Europe (as indicated in the Commission's Questionnaire) would probably lead to a greater heterogeneity in terms wholesale access prices.

BEREC agrees with the Commission that there is a need to look at costing methodologies. However, this does not necessarily stem from the DAE targets, but from the ongoing technological development and how best to maintain and promote effective competition and safeguard consumers (including consumers of existing voice and broadband services) as the migration from copper to fibre access is made.

4. The demand side, the DAE target and the objectives of the regulatory framework

The Commission identified (p. 2) that in most Member States "fibre roll-out is still limited". BEEC believes that although roll-out may be limited, it is progressing.[6] The feasibility of achieving a higher ARPU is an important factor affecting the profitability of NGA roll-out[7]. In that respect, BEREC has previously identified that the actual take-up of NGA high-speed broadband services falls short of the coverage achieved already, because there is still a lack of demand for high-end services.

In this situation, demand-side factors feedback on the viability of broadband projects which could have an impact on roll-out plans. BEREC has therefore argued that these demand-side factors need to be taken into account when assessing the achievement of national broadband targets and the DAE target[8]. Typically, take-up of innovative services needs time to

[5] P. 2 of the Consultation Questionnaire. For a deeper analysis see also RTR Consultation input. The "high" Irish ULL prices can be explained with the following structural factors: (1) the fact that that costs are higher because of low population density compared to other countries and the high proportion of one off housing in rural areas and (2) the cost of very long loops. For further details see http://www.comreg.ie/_fileupload/publications/ComReg1010.pdf.

[6] The following examples show that investment in NGA networks is taking place from all operators. One example for high speed broadband network roll-out is Virgin Media's cable investment to roll out 100Mbit/s to its existing customers in the UK ,see http://www.cable.co.uk/news/bt-claims-extra-sharp-spade-will-speed-up-fibre-broadband-rollout-800788379/. Another is the announcement of Eircom to invest in a fibre network in Ireland, for further details see: http://www.nextgenerationnetwork.ie/ngn-access. In Malta Melita Cable has a nationwide network based on DOCSIS 3.0. According to an article published on Computerworld.dk, the Danish incumbent, TDC, plans to launch a retail fibre product (including broadband, IP-telephony and IPTV) during next week. Initially, TDC will focus on Northern Zealand, where they already have a lot of fibre infrastructure, but within the near future they intend to start expanding their retail offer to the remaining parts of the country. For a more comprehensive picture see Annex I – Detailed description of broadband markets across Europe.

[7] See ERG (07) 16rev2.

[8] See BoR (11) 06.

unfold and markets should be given the time to develop progressively from an early stage to maturity. Also, it must not be forgotten that NRAs have limited possibilities to push take-up.

If demand for high speed broadband stays behind an approach of pulling the DAE target that involves steering investment and market outcome may be in conflict with the objectives of the regulatory framework as stated in Art. 8 Framework Directive. BEREC thinks that the pro-competitive approach of the European framework – relying on access regulation with consistently priced access products along the value chain following the ladder of investment principle – steers efficient investment of all market players. BEREC therefore advises against a policy change that risks losing the long term benefits of a stable regulatory environment based on the principles of the regulatory framework that has proven capable of successfully managing the transition from monopoly towards markets open to competition and should therefore be continued for the transition to NGA.

When regulated prices are set according to policy needs superseding the regulatory objectives of the electronic communications framework, this might lead to unintended consequences. Ultimately, regulated prices should be set cost-oriented following a thorough economic and accounting analysis instead of being "*reverse engineered*" (i.e. "we want a low price and therefore we choose a particular costing methodology") from multiple objectives, in particular those which go beyond remedying SMP. Thinking backwards from a desired result would send the wrong economic signals and distort market developments. Such an approach risks neither setting the right incentives for efficient investment nor promoting a level playing field for competition to develop.

5. Incentives

Investment by incumbents and entrants requires consistency in pricing, and a minimum stability in the regulatory regime (i.e. the process by which wholesale access prices along the ladder of investment are determined). Where a regulatory regime provides the opportunity for prices to rivals to be increased (or not reduced) based on some future commitments by the incumbent, this creates scope for gaming and increases the regulatory burden (in order to police fulfilment of any commitments). The risk of such gaming may create an investment environment which is less attractive to entrants.

Conclusion

As pointed out by Commissioner *Kroes* in her speech at the ETNO FT 2011 CEO Summit on 3rd October[9], the arguments of both sides – incumbents as well as competitors – "have some truth" in them and simply lowering the unbundled copper access prices will not "do the trick". The question to be answered is not whether "the price is too low or too high?", but "does the regulated price send the right economic signal, i.e. is the price competitively (and technologically) neutral?" If the answer is yes, it will steer the market towards an efficient outcome (in terms of competition, investment and ensuring consumers are safeguarded as the industry moves to NGA infrastructure). In BEREC's view this will best be achieved with cost-oriented access prices seeking to mimic the outcome of a competitive market where the equilibrium price reflects the cost of efficient service provision.

In summary BEREC maintains that any recommendation on wholesale access costing methodologies should be firmly based on the fundamental principles of the 2009 European regulatory framework and focus on the promotion of competition, safeguard the interests of consumers of existing (as well as future) services, encourage efficient investment by providing regulatory predictability to all market players and seeking to maintain a level-playing field between incumbents and entrants (including those using competing platforms).

[9] *Kroes*, Investing in digital networks. A bridge to Europe's future", Speech/11/623.

Finally, it is important to bear in mind the interplay of regulation with activities of other public bodies and private stakeholders, in particular state aid / public funding. There should be a safeguard mechanism to prevent that cumulating measures to stimulate NGA network roll-out results in crowding out private investment where public funds are involved. Specifically, the Commission questionnaire suggests some possibilities of incentivising fibre roll-out, which should not be accumulated with other public incentive programs. Also, potential tensions between state aid provisions and SMP regulation should be smoothed out.[10]

III. Legal Context and Scope

Question 2 Definition of key access products

BEREC agrees that the three wholesale access products of markets 4, 5 and 6 are the most relevant access products to be looked at bearing in mind however that in order to ensure the proper implementation of the ladder of investment related products may also have to be looked at according to the competition problems identified and consistently priced.

IV. Possible Costing Methodologies

Questions 3 – 7 Costing methodologies

Firstly, BEREC likes to point out that price control obligations can be implemented in different degrees, ranging from cost-oriented price controls to other forms of charge controls (such as a price cap, retail minus etc.). In the following deliberations BEREC focuses mainly on cost-orientation as the default assumption provided for by the NGA Recommendation (Recommend 25 and 35).

The deliberations hereafter are structured in the following way: firstly the two key factors determining the choice of the appropriate costing methodology are identified. Secondly, the process of cost modelling and pricing a regulator must run through is explained in more detail. Finally, these two parts are brought together ("mapping") and the result of the analysis is presented as a decision portfolio matrix which shows the typical combinations of costing methodologies which are best suited in a given regulatory situation. This structure has the purpose of highlighting the logic of regulatory decision making when applying a particular costing methodology to set wholesale access prices.

BEREC considers that the choice of the costing methodology is determined by two key factors: the prioritisation of the regulatory objectives and prevailing market conditions. As the underlying market changes and responds to regulatory interventions, we would expect the relative weighting of the objectives to change over time, leading to potentially different regulatory tools to be adopted. Similarly, the range of regulatory instruments applied by NRAs at a particular point in time is a function of these two factors. The important key consideration is that NRAs apply regulatory instruments based on common principles with the aim of achieving common objectives.

While following common principles, different regulatory objectives and market circumstances will be reflected in the design of remedies most appropriate to serve the regulatory strategy chosen by the NRA, as explored below. However, it is important to state that regulatory consistency across Europe is achieved by applying common principles, but in order to regulate effectively NRAs must be left with the discretion to adjust the details of the remedies to fit their national market circumstances as these differ. In order to regulate effectively these dif-

[10] See also BEREC Report on Open Access, BoR (11) 05.

ferences cannot be ignored. These two pillars of the European regulatory framework – regulatory consistency across Europe and flexibility of national regulators – must be seen together and be balanced carefully.

By distinguishing broadly between two main objectives and two typical country (competitive) scenarios BEREC has developed a matrix that results in four characteristic regulatory situations. The regulatory objectives can be broadly categorised into ones that focus on retail competition (demand-side oriented) and ones that concentrate on wholesale competition (supply-side oriented). Wholesale competition includes both competition based on several infrastructures as well as access-based competition (following the ladder of investment principle). It is recognised that the objectives are all interlinked: competition is important for increasing economic growth, innovation, stimulating efficient investment (and vice versa) and consumer choice.

The first factor is the main regulatory objective, measured along the horizontal axis in Figure 1 below. The range of objectives has been grouped into two types: supply-side and the promotion of investments in alternative infrastructures[11] versus the demand-side and the promotion of take-up of superfast broadband services. The first of this gives more weight to the development of competition from the wholesale side, whereas the latter gives more weight to the retail market. This is illustrated below in Figure 1.

The second is the intensity of competition, as shown along the vertical axis in Figure 1 below. We generalise two main competitive scenarios, characterised by the presence or absence of alternative infrastructures (such as cable, fibre, or wireless) to the copper network. We note that these scenarios are presented for the country as a whole, but competitive conditions may also differ across regions within a country.

Each NRA may prioritise the different objectives of the regulatory framework in the light of market circumstances, which change over time. For example, countries that have extensive cable network coverage may already see inter-platform competition between copper and cable networks. In the medium term we also expect to see increasing deployment of faster mobile broadband (e.g. LTE). The objective of promoting further investment in next generation access or broadband take-up will require ensuring a level playing field between these competing platforms. On the other hand, in areas where copper is the only network available, intra-platform competition (both facilities-based using ULL inputs as well as service-based using bitstream access and resale) is the main driver for competition. In this situation, there may be a need to encourage investment in enhanced networks as well as preserving existing levels of competition.

[11] It is generally considered to be desirable to have several alternative infrastructures as “two is not enough”.

Figure 1. Situations based on regulatory objectives and market circumstances

		Regulatory objectives	
		Push supply-side, e.g. wholesale competition, promote network roll-out and efficient investment	Push demand-side, e.g. retail market, promote broadband take-up
Intensity of competition – country scenario / market circumstances	Multiple infra-structures (e.g. cable, mobile etc.)	3	4
	One infrastructure (i.e. copper)	2	1

It is important to recognise that these four situations are not static. There needs to be a long term perspective and NRAs must have the flexibility to adapt an NRA's regulatory strategy according to changing market circumstances (e.g. moving from one infrastructure to multiple infrastructures). There is also a need to prioritise objectives so that at certain stages of market development, an NRA can focus on one tool over another based on their potential impacts on the market.

It should also be emphasised that the policies are not mutually exclusive but, in general, the adopted priority is a consequence of the country scenario (for example, as result of historical development, geography, population density/dispersion, roll-out strategies, quality of the copper network and stage of network development, demand characteristics, purchasing power, etc) with the final objective of developing the whole market from both demand and supply sides.

The situations set out Figure 1 can be described as follows:

- Situation 1 describes the existence of a single copper network, and the underlying economics does not support an additional infrastructure in place, for example because of the geography of the territory (e.g. population density and dispersion), and/or investments in broadband networks can be possible only by means of public funding in accordance with State Aid rules. In this situation it is likely that the demand is intrinsically limited and cannot sustain investment in innovation; the main objective is therefore to prevent excessive pricing at the wholesale and retail levels.[12]

- Next, the situation changes to one where there is a case for promoting infrastructure investment (Situation 2). There could already be competition based on existing wholesale access products (such as unbundling and bitstream). As a result of effective upstream competition, no single operator has SMP at the retail level so retail prices are not regulated. The challenge here is then to promote investment in alternative infrastructures whilst preserving intra-platform competition where it exists, or promote them where they don't, with an eye for the impact of investment on consumers.

[12] This may include retail price control regulation.

- Once there are multiple platforms (Situation 3), market conditions could still exist to drive investments in new infrastructures, for example for the transition from copper to fibre. The challenges faced by NRAs are similar to the situation above, with the additional issue of migration to consider.[13]

- Finally, where the market is characterised by a sufficient inter-platform competition[14] the focus is on promoting further take up of superfast broadband services, i.e. stimulating demand (Situation 4).

Underpinning the suite of remedies available is pricing. The copper access network is commonly recognised as an economic bottleneck characterised by a large degree of sunk costs made over the last few decades. In addition, there has now been a long history of demand for the retail services provided over the copper network. Cost-oriented pricing is a well-established tool for promoting competition on copper access network. Furthermore, cost-oriented price regulation is a very important rule in response to the lack of transparency on production costs of a (typically incumbent) network owner. At the same time it can be used to give the right signals to stimulate timely and efficient investments. The incentivisation of investment in NGA means that a coherent regulatory approach both along the ladder of investment (intra-modal competition) as well as across platforms (inter-modal competition) is required, in particular pricing must be consistent and ensure that margin squeeze between different wholesale access products as well as between the wholesale and the retail level is avoided.

Before mapping country scenarios to the market conditions/regulatory objectives matrix which implies best suited costing methodologies for each of the four situations shown in Figure 1 BEREC likes to draw the attention on the decision making process when choosing the appropriate costing methodology for setting prices for wholesale access products in SMP markets.

Cost modelling and regulatory pricing process

When a cost-oriented price control obligation is imposed by the NRA on a given wholesale product, it becomes necessary to specify the relevant costing methodology to be used as a reference for setting the charges. This is because they are typically set such that the SMP operator's revenues generated from the regulated wholesale products are explicitly linked to the underlying costs of providing such services. A price control is aimed at mimicking the pressures to reduce costs and pass some or all of it onto prices that would be expected in a competitive market. Any costing methodology selected must allow the recovery of efficiently incurred costs as the relevant cost standard and follow the principle of cost causality.

There are different ways in which regulated charges can be set. The "direct" method uses the costs of providing these services based on accounting information, and/or estimated/calculated costs using for example models of the underlying network. The indirect method uses a combination of retail market prices, margin squeeze tests, safeguard caps. An alternative is to use international price comparisons.

When referring to the costs of the wholesale access product in order to set its charges, the cost modelling process consists of defining the relevant annual costs of the underlying assets (capital costs) and the recurring operating costs (OPEX) related to the wholesale product(s) in question. There are four main stages leading from the determination of the cost stack to the pricing of regulated services:

- the choice of the relevant asset base,

[13] Depending on the competitive situation, this may still include applying strong access obligations.
[14] However, one operator is still found to have SMP on a market susceptible to ex-ante regulation.

- the choice of the relevant cost annualisation method,
- the choice of the relevant cost allocation method,
- the choice of the relevant price control method.

The first three stages deal with costing whereas the last stage deals with pricing. Each of these stages must be run through by the regulator. It is important not to confuse the different stages of the cost modelling and price setting process and to keep in mind that these are methods to account/calculate the costs efficiently incurred for providing the service looked at factoring in parameters and developments. Thus the costing methodologies reflect these factors, but are not their cause. For example the fact that the usage of copper lines is declining and thus costs per line increasing would be the same in every cost model that uses constant depreciation (whether CCA or HCA, see below) and does not depend on the use of a BU-LRIC model[15]. Therefore BEREC considers that the issue related to the increase of unit costs due to the decrease of volumes on the copper network should not be addressed by switching to a new costing methodology potentially leading to lower prices and then mitigating the unit cost problem, but rather by addressing the underlying cause, e.g. by means of an efficiency based approach.

In the following section the most important features of the costing stages are described.

The choice of the relevant asset base

The first stage of costing process consists in the choice of the relevant asset base modelling approach. At this stage, NRAs consider which cost reference is better suited in order to set the price of a given wholesale product.

Two main approaches exist in terms of asset base:

- A top-down (TD) approach whereby the historically accounted (= actually incurred) costs of the regulated operator's asset base are usually taken as the starting point, i.e. the asset base includes the history of previously incurred investments, and
- A bottom-up (BU) approach assuming the current costs of a generic and/or efficient operator would incur in order to provide the same wholesale service, based on an economic and/or engineering model (analytical cost model).

It is generally admitted that an operator's books often deliver a cost signal which is not directly suitable for pricing when relying on a cost accounting approach (regulatory accounts). As a matter of fact, charges calculated over operator's books, might include inefficient costs incurred by the incumbent that should not be recovered from competitors.[16] Conversely, the value of some assets might be largely or fully depreciated[17], but still in use and therefore the net asset value in the books do not represent their economic values. There may also be cases where the underlying investments incurred during their time as state monopolies might be only partially recorded.

[15] As suggested on p. 3 of the Consultation Questionnaire.
[16] And would therefore require efficiency adjustments by the NRA. However, if an SMP operator responds to "competitive pressure" of alternative roll-outs (as is e.g. the situation in Austria) this might not be necessary.
[17] See for instance the European Court of Justice, case C-55/06 Arcor AG & Co. KG v Federal Republic of Germany on 24 April, 2008: "*if the cost calculation basis were based exclusively on historic costs, which, depending of the age of the network, could potentially lead to account being taken of an almost entirely depreciated network and thus result in a very low tariff, the notified operator would be faced with unjustified disadvantages".* (104).

Hence, when setting access charges based on a costing approach, NRAs have to determine the most relevant cost signal for both access seekers and access owners which, most of the time, cannot be directly extracted from existing financial accounts.

The choice of the relevant cost annualisation method

Investment costs are recorded for a given year whereas the corresponding assets are employed over time by the firms. The different methods spread investment costs over time and result in a series of annualised costs for each asset, each of which corresponds to the portion of the investment costs allocated to the year in question. The prices for regulated services are then set with reference to these costs. The approach taken in this stage is therefore an important consideration as well as the time frame taken into account.

From a pure accounting point of view, three main big families of investments costs annualisation methodologies exist:

- A first family of cost annualisation methodologies, issued from the accounting practice, annualise investment costs based on constant depreciation. As a result, the depreciation share is stable and the cost of capital share decreases over time. This results in decreasing annuities. Constant depreciations not readjusted for price evolution are usually referred to as “linear depreciation” and are usually used within the “historical cost accounting” (HCA) method. Constant depreciation readjusted for price evolution is usually referred to as “current cost accounting” (CCA). Depending on the type of prices used for the adjustment, competitive conditions can be factored in a CCA approach (e.g. by using market-values for the asset prices). It is important to note that HCA and CCA belong to the same family and the differences are not so significant compared to more significant differences stemming from straight-line depreciation or annuities, modified tilted annuities or economic depreciation (see below).

- A second family, issued from an economic approach of the accounting practice, annualise investment costs based on constant annuities. So, the depreciation share increases from year to year and the cost of capital share decreases proportionally from year to year.[18] This results in stable annuities. Constant annuities not readjusted for price evolution are usually referred to as “constant annuities”. Constant annuities readjusted for price evolution are usually referred to as “tilted annuities”.

- A third family, issued from the economic practice, annualise investment costs based on a hypothesis on exogenous parameters. These methods readjust annuities based on, for example, the evolution of demand for the underlying product or on the expected revenues the operator will get from the underlying wholesale product:

    - It is usually referred to as “economic depreciation” methodology (ED) when constant annuities are adjusted to the scale of demand and changes in prices. This consists of spreading out annual costs in such a way as to obtain stable unit costs. It is therefore based on establishing a growth hypothesis for demand. A pure economic depreciation methodology therefore uses the path of prices consistent with a competitive market (e.g. if the replacement cost of inputs is falling, entrants could come into the market and undercut the incumbent if the latter did not lower its prices);

[18] For example, similar to a stream of mortgage repayments.

- The “discounted cash flows” methodology (DCF) adjusts annuities based on the business plan and the expected revenues of the operator.

In most cases, economic annualisation methods also imply hypotheses on price evolution over the future and are then readjusted for price evolution by default.

All these methods result in different cost annualisation slopes[19] but from a cost recovery perspective provide exactly the same result as the net present value (NPV) result in that the stream of permitted revenues always matches the initial investment[20]. In the case of the transition from legacy to NGA networks, annualisation methods that readjust annual costs for price evolution (such as CCA, tilted annuities, and economic depreciation) are the most likely candidates for promoting efficient wholesale infrastructure-based competition and the roll-out of NGA networks from operators since these methods incorporate the current cost “make-or-buy” signal.[21]

On the other hand, if an NRA wants to prioritise retail competition and ultra-fast broadband take-up from end-users it will generally opt for a cost signal which is consistent with the incumbent’s accounting books (based on historical costs[22]) given by the “linear depreciation” method. For the treatment of non-NGA assets most investment costs were incurred in the past and for assets where replacement costs are increasing, such an approach is likely to lead to lower charges.

The “economic depreciation” and the “discounted cash flows” methodologies may be particularly suited for the treatment of transition phases as they allow smoothing the increase of unit costs forecasting for market demand. Nevertheless, the adoption of these methods may be delicate given the large set of hypotheses on market evolution which is needed in order to implement them (e.g. forecasting of demand, investments, revenues, prices evolution etc.).

The choice of the relevant asset base and the cost annualisation method already includes the assessment of the replicability of an asset (see also below, Q8-Q14).

Finally it is important to note that – unless performed correctly (i.e. starting using the new method from the NPV of the previous method) – switching from one costing methodology to another, e.g. HCA to CCA or HCA to ED risks either cost under- or over-recovery, each of which can be unattractive for the operator or for the customer, respectively. Moreover, in a repeated game of regulation, NRAs that switch methodology to deliver the result that most suits them at a particular point in time, risk generation regulatory uncertainty – exposing themselves to appeals based on inconsistent accounting or economic principles. As stated above, a credible regulatory commitment is of utmost importance to gain investors’ confidence.

The choice of the relevant cost allocation method

As telecommunications operators are multi-product firms, after having determined their annual costs following the annualisation method, it is necessary to allocate the operator a share of the total costs to the different wholesale products in question in order to define the relevant cost of a given wholesale product.

[19] Paths of prices.
[20] In the operational capital maintenance version of the CCA method nevertheless (OCM, as opposed to the financial capital maintenance version, FCM), as this method aims to recover the costs of an asset with the same productive capability as the initial one, but the net present value of the sum of the annuities may be higher or lower compared to the initial investment following the presence of negative or positive technical progress.
[21] The adoption of an annualisation methodology in current costs as CCA or tilted annuities coupled with a current costs asset base as cost source can nevertheless result in charges which may be inconsistent with the endogenous cost signal provided by the accounted costs of the operator.
[22] Possibly with an efficiency adjustment, see above.

Two main approaches in terms of cost allocation exist in order to define the relevant cost base: a cost allocation following a fully distributed costs methodology (FDC) and a cost allocation following an incremental costs methodology (long run incremental costs, LRIC/LRAIC).

In a fully distributed costs methodology (sometimes also known as fully allocated costs or FAC), the whole set of costs incurred by the regulated operator are typically allocated to products following allocation rules determined by the direct or indirect causality of costs with products. This approach results in a cost signal which is proper to the regulated firm as it also includes "fixed" and common costs.

A fully distributed cost approach results in a price signal which has the advantage to be fairly consistent with the recorded investments incurred by the firm but, as it involves that all the costs of production of a given wholesale product are accounted for in the cost base, which may potentially induce the firm to perform inefficiently and to inflate its asset base. As such, if this approach is adopted, care should be taken to ensure that such costs are excluded.

In an incremental costs methodology, only costs that would not be incurred if the incremental service was no longer produced by the operator are considered. This approach results in a cost signal which is less consistent with the accounted costs of the regulated operator. This is because the regulatory accounts are based on fully distributed costs.

An allocation method based on (forward looking) long run (average) incremental costs (including an appropriate mark-up for common costs)[23] can reflect the cost structure characterised by both economies of scale and scope. As a result, new entrants participate in the cost savings of the incumbent due to economies of scale and scope.

The incremental costs approach provides a price signal which focuses more on the cost of the increment of the service added (e.g. ULL). This gives an incentive towards productive and dynamic efficiency as it only allocates on a given wholesale product efficiently incurred costs that would not be sustained if the service included in the increment was no longer produced (i.e. avoidable costs) but which has the disadvantage to discard the investments incurred by the firm.

In the case of the transition from a legacy access network to a NGA network, a fully distributed cost allocation linked with the historical costs accounting method will then generally be chosen within a regulatory approach that favours low retail prices because it gives a cost signal which is closer to the internal cost the incumbent incurs in order to provide the given wholesale product.

An incremental cost allocation linked with a current costs annualisation method like CCA or tilted annuities will instead generally be chosen within a regulatory approach that favours infrastructure-based competition on the supply-side and the roll-out of ultra-fast broadband networks because it gives a cost signal which is closer to the average cost an efficient operator incurs in order to provide the given wholesale product.

The choice of the relevant price control method

In addition to the assessment of the relevant costs for each wholesale product provided by the operator following the three costing stages described above, the NRA needs to assess the relevant price control method in order to set charges on this product. According to the pricing rule chosen, NRAs would use the corresponding costing methodology (or combination of costing methods).

[23] Cf. also ERG Common Position – Guidelines for Implementing the Commission's Recommendation C (2005) 3480 on Accounting Separation and Cost Accounting Systems under the regulatory framework for electronic communications (ERG (05) 29), pp. 18.

In general, a (strict) cost-orientation obligation will be preferred on a given product if, in order to set charges on this product, the NRA follows a regulatory approach which favours a (perfect) equality between the costs resulting from the above described costing stages and wholesale prices and which aims to give incentives for efficient investments including climbing up the ladder to the regulated firm.

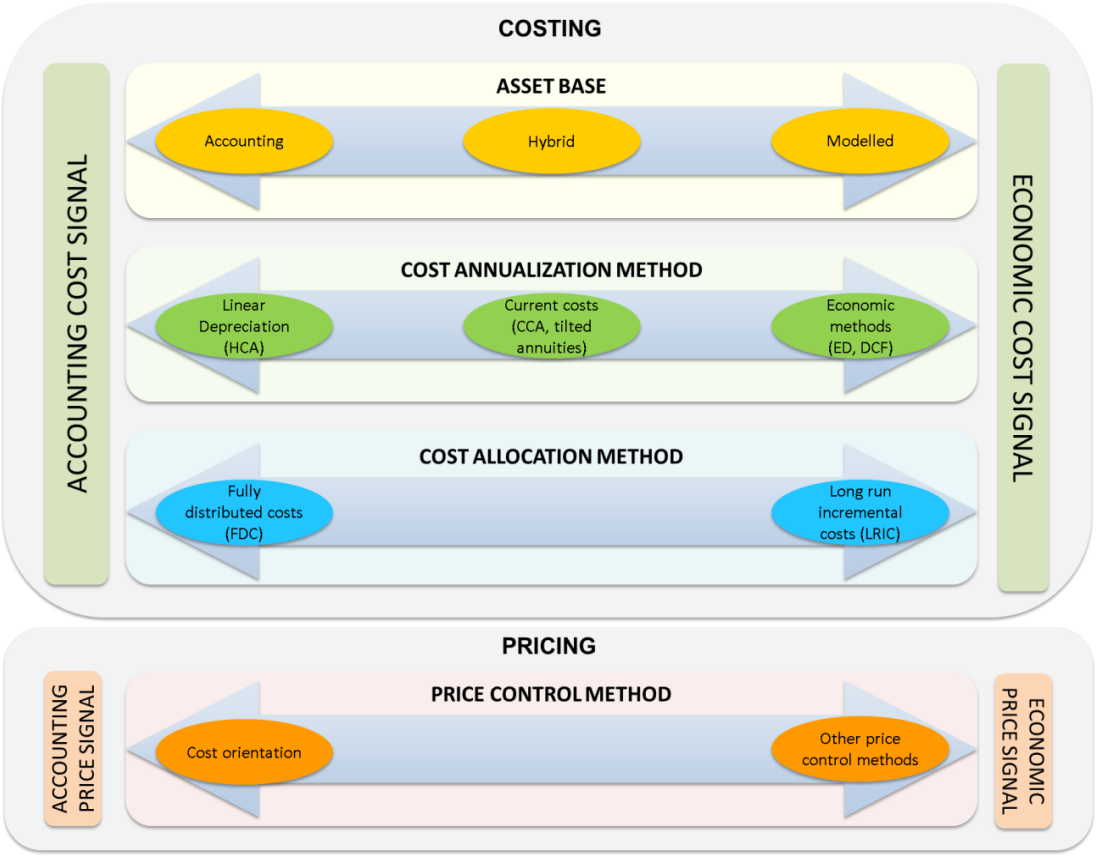
Less strict price control obligations than cost orientation will be preferred instead when the regulator prioritises other regulatory objectives such as providing flexibility to operators when going forward on the ladder of investments or incentivise technological changes.

The result of different stages of the cost modelling and pricing process

In summary, in order to cost and price each asset composing a wholesale product, NRAs select the most appropriate asset base, the annualisation method, the cost allocation method and the price control method. These choices may be influenced by a regulatory approach which is more supply-side or demand-side oriented, but may be also largely dependent on the national market circumstances (i.e. competitive situation), to the availability of information on costs etc.. The regulatory pricing decision also includes consideration of the time period of the price control and (automatic) adjustments during its duration.

Figure 2 below resumes the different choices that NRAs have to take at the four different stages leading from costing to pricing and their main properties:

Figure 2. Summary of different stages of the cost modelling and pricing process



The four choices done by the NRAs at the different stages leading from costing to pricing will result in a cost signal which can be more accounting or economic and which is supposed to

be the most appropriate one for the considered wholesale product given the national market circumstances and the NRA's regulatory objectives (see next section).

The analysis of the subsequent stages of the cost modelling and regulatory pricing process has shown that the prices are a result of a complex sequence of decisions factoring in a multitude of costing parameters interacting with each other. One cannot arbitrarily intervene at one stage and make an isolated change to one parameter without impacting on the following stages of the multi-stage process. Doing so might have unintended consequences. The result cannot be attributed solely to one parameter or element, but reflects the influence of all factors and follows from a thorough economic and accounting analysis.

Thus it is important to note that it cannot be said a priori whether there would be an increase or decrease when switching from say HCA to CCA or vice-versa, as this is the sum of all factors and depends on the starting point. In any case an increase or decrease should not pose a problem if it reflects changes in costs and is consistent with what would be expected in a competitive market (which economic regulation is typically seeking to mimic). Also, it cannot generally be said that the choice of a particular costing methodology always implies higher prices than another, e.g. that CCA leads to higher prices than the use of HCA.[24] Again, this is the result of various factors and their interaction that follows from a robust economic analysis.

Mapping of the country scenarios to the market conditions/regulatory objectives matrix

The analysis spelled out above on the costing methodologies can be summarised by the decision portfolio matrix shown in Figure 3 below (shown in generic form already in Figure 1 above). The decision for the pricing/costing-method to be chosen depends on the intensity/level of access competition (country scenario) and the regulatory objectives.

There are two major factors influencing the choice of the appropriate costing methodologies: the country-specific market situation and the NRA's regulatory priorities. In the below matrix we have identified two typical scenarios: access competition with or without (or little) presence of alternative infrastructure (mostly cable), which is shown on the vertical axis. The underlying assumption with regard to the competitive situation is that where alternative infrastructures are present, competition would be more intense pushing at the same time also roll-out of NGA infrastructures.

As for regulatory priorities two major objectives stemming both from the regulatory framework and the DAE targets were identified above: in the first case the regulator puts more emphasis on the supply side / wholesale competition in order to encourage NGA roll-out and efficient investment, in the second case the regulator would potentially prioritise retail competition and encourage NGA take-up (i.e. taking the consumers' perspective). The regulatory objectives are shown on the horizontal axis. In both cases, this does not mean that the NRA would "forget" about the other objectives, but one would be prioritised over the other based on the country scenario as described above.

Depending on the relative weight the NRA puts on the two regulatory objectives identified and the actual intensity of access competition, different pricing principles linked to typical combinations of costing methodologies are best suited. The result of the analysis is presented with the decision portfolio matrix shown in Figure 3 below which covers all country scenar-

[24] As the example of the latest German ULL price decision (2011) shows the use of a BU CCA/LRIC model must not lead to higher ULL prices even when there is a decrease in the number of copper lines used.

ios.[25] It reflects the actual situations of NRAs which are placed in different fields according to the phase or stage they are actually in.

Figure 3. NRA pricing and costing approach decision matrix

		Regulatory objectives	
		Push supply-side, e.g. wholesale competition, promote network roll-out and efficient investment	Push demand-side, e.g. retail market, promote broadband take-up
Intensity of competition – country scenario / market circumstances	Access competition exists. Presence of alternative infrastructures	Neutral make-or-buy decision **3** CCA/LRIC DCF	Regulatory price control **4** Retail minus / safeguard cap
	Access competition low. No presence of alternative infrastructure	Efficient make-or-buy decision **2** Cost orientation: CCA/LRIC	Low retail prices **1** Cost orientation: HCA/FDC

The matrix shows that this leads to typical situations implying certain costing methodologies and pricing rules best (or at least better) suited to achieve the prioritised regulatory goal in a given country scenario which the NRA cannot change easily, because it is a result of a historical development, of structural factors, namely geographies, topology, population density/dispersion[26] as well as market situations stemming from demand characteristics, consumer preferences and supply side factors such as roll-out strategies or stage of roll-out by competing operators etc..

In order to allow NRAs to make a choice that fits national needs while at the same time following common principles in order to ensure consistency across Europe BEREC is of the view that the planned recommendation on costing methodologies for key wholesale access products should provide for the two most common scenarios and leave discretion/flexibility to NRAs to prioritise their regulatory objectives. Thus as shown in the matrix two typical situations would determine the appropriate pricing/costing methodologies as best practice recommendation. To start with an NRA where access competition is low would likely prioritise the promotion/incentivisation of efficient investment with strict cost-orientation in which case the most appropriate costing methodology would be the combination of CCA/LRIC (Situation No. 2: Efficient make-or-buy-decision) and an emphasis on consistency of access prices along the ladder of investment in order to avoid distorting intra-modal competition while an NRA where a second alternative infrastructure is already present would potentially put more focus on take-up and retail competition and thus use a retail minus or safety cap approach rather than (strict) cost orientation (Situation No 4: Regulatory price control). Thus moving on from strict cost-orientation in the access pricing (vertical move) may be considered an alternative in situations where a high(er) level of broadband roll-out and of competition is achieved already limiting the ability of the SMP operator to charge abusively high retail pric-

[25] see also Annex I for a detailed description of broadband markets across Europe.
[26] Determining mainly the civil engineering costs that make up around 70-80% of all costs and vary largely across Europe due to the structural differences.

es. Therefore a retail-minus approach could be viable. In case emphasis is put on stimulating broadband take up a safety cap could be another solution. Clearly Situation No 4 is characterised as the last regulatory step before competition law oversight can take over. It therefore allows a "softer" form of price control than the situations No 2 and 3.

With emerging competition promoted by (alternative) efficient investment a transitional situation can be identified. When alternative infrastructure exists, it is important that the NRA's costing methodology remains neutral vis-à-vis all infrastructures (Situation No 3: Neutral make-or-buy-decision) in order to avoid distorting intermodal competition. The efficient-make-or-buy signal in Situation No 2 can be considered as dynamic (pushing upward) whereas the technology neutral make-or-buy signal in Situation No 3 is rather a static one (already in the upper field). Generally the same costing methodologies as in Situation No 2 remain feasible, while a stronger level of competition may allow for more flexibility in the pricing rule. Once a well established infrastructure-competition has manifested, the focus of the NRA may shift from the supply side to the demand side (horizontal move) promoting further broadband take-up with the move to Situation No 4 and the implications described above on access and retail pricing. Ultimately, this would lead to a competitive market allowing withdrawal of regulation and transition into general competition law oversight.

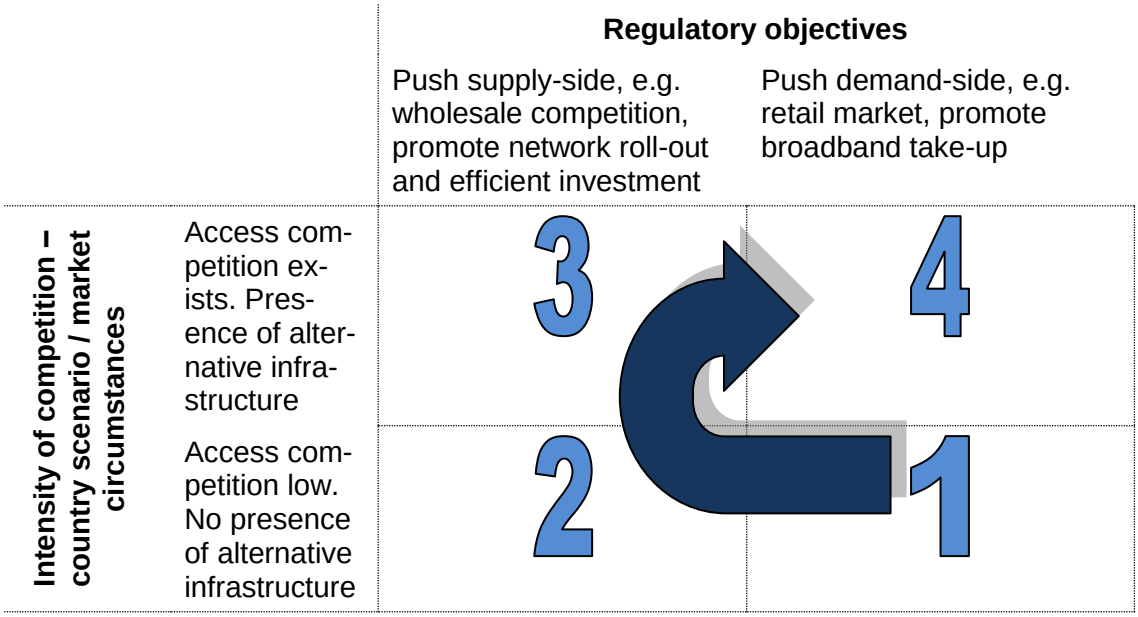
Typically, a forward-looking CCA/LRIC[27] approach ensures an efficient (undistorted) make-or-buy decision thus ensuring efficient investment giving incentives to all market players. BEREC believes that the properties of CCA/LRIC are still fit to handle the transition towards NGA roll-out and that no new methods are required if the existing ones are applied correctly and consistently. Of course, the parameters need to be adapted to reflect NGA economics[28], but that is more a matter of technical handling rather than conceptual redesign. DCF may be added as a complementary method. The continued suitability of the CCA/LRIC is an important point as the BEREC Regulatory Accounting in Practice Report 2011[29] shows that meanwhile a stable level is reached with the majority of NRAs using the combination of CCA/LRIC.[30] Furthermore BEREC believes that an equally important factor guiding investment by market players is regulatory stability particularly vis-à-vis the costing and regulatory pricing approach. A regulatory pricing scheme which is vulnerable to exploitation by incumbents may compromise efficient investment.

It is important to understand, that the four situations shown in the portfolio decision matrix are not meant to remain static. NRAs must be aware of dynamic efficiency more than in the "static copper world of the past" and take a long term perspective, i.e. be aware of the changing environment following investment and market development. This is reflected by the move from one field of the matrix to another potentially requiring adjustment of the regulatory strategy over time as well. Taking into account the impact of pricing/costing methodology on the market situation and the regulatory objectives and vice versa, the move through the matrix can be thought of as an ideal path a NRA may want to pursue as a long term strategy. The speed of the transition from one situation to the next depends on the development of the market. NRAs would follow a path that promotes efficient infrastructure investment – and hence NGA roll-out and competition – to finally reach a situation that allows to shift focus on high consumer surplus with low retail prices and a high level of broadband service provision. As shown in Figure 4 below the ideal path follows a circle from the lower right (Situation No 1: Low retail prices, typically associated with HCA/FDC is only the starting point and this

[27] CCA/LRIC (HCA/FDC) is understood as combination.
[28] Cf. ERG/BEREC NGA reports: ERG (09) 17 – NGA Economic Analysis and Regulatory Principles; BoR (10) 08 – NGA Wholesale Access Products; BoR (11) 06 – NGA Report; and BoR (11) 43 – BEREC report on the Implementation of the NGA Recommendation.
[29] BoR (11) 34, October 2011.
[30] Cf. Figures 2 and 3 and 24 of the BEREC Report on Regulatory Accounting in practice 2011 (BoR (11) 34): CCA/LRIC is clearly the preferred combination in M4 and in M5 (less marked for the costing methodology), though less in M6 (majority still using FDC).

costing combination should not be retained as it is not desirable[31)] via the left hand supply-side focused situations (No 2 and 3) to the upper right (Situation No 4) implying the use of the recommended pricing/costing methodologies.

Figure 4. Example of a dynamic regulatory path



However, during the transition period regulatory predictability is of highest importance as operators must have the assurance that the regulatory strategy will not be changed over night, but remains the same for the foreseeable future/regulatory period so they can rely on the rules and can factor the parameters etc. in their calculations and build a solid business case.

Summing up, BEREC is of the view that the recommendation should acknowledge that different national situations exist across Member States influencing the regulatory strategy (i.e. prioritisation of regulatory goals) and allow for two typical situations (No. 2 and 4, see above) for which the recommendation would then foresee the most appropriate costing methodologies in order to ensure regulatory consistency across Europe that follow from the matrix for each of the four regulatory situations. This ensures that each of the situations is treated with a consistent costing approach across Europe, but not all are dealt with the same model as a one-size-fits-all approach will not be appropriate for different market situations. In terms of costing methodologies BEREC considers that a forward looking CCA/LRIC approach (complemented by DCF in Situation No 3) is still fit for purpose.

With regard to Question 7 BEREC thinks that fibre investment would be efficient. NRAs first need to consider which underlying technology should be taken into account in order to price a given wholesale product. If the NRA considers that the legacy technology is not any longer appropriate (for example, if it is no longer the efficient technology in order to provide the access wholesale product and/or that no operator entering the market today would deploy such a network), the alternative would be to consider the "Modern Equivalent Asset" (MEA)[32] in order to cost access wholesale products reflecting the technology that would be used today, i.e. the least cost technology. For example, a NGA/NGN fibre network is often considered as

[31] Generally this is a combination leaning on the accounted costs and gives an accounting signal (as opposed to an economic signal, see above Figure 2).
[32] See also below Q15.

the MEA of the legacy copper network. However there may be other alternatives and it may vary according to geographies, also within a country as the Swedish example shows. PTS adopted fibre as MEA in its model, but distinguished five geotypes and also added wireless technology as MEA in those areas where no fixed access is available. The regulator must analyse the costs and cost structure of the MEA carefully and assess whether the technology is reliable for a national network. If the MEA has greater functionality and/or flexibility than the existing technology, a methodology is then required to "abate" or reduce the MEA costs for the services of a reduced "quality". When choosing the MEA the regulator must be careful not to prejudge technological choices of the operator or cut off technological options. The choice will also depend on the competitive pressure from alternative infrastructures (e.g. cable, mobile).

Questions 8 – 14 Asset valuation and replicability considerations

In responding to Question 8, BEREC notes that there should be a consistent treatment between wholesale services and between different technologies in the determination of the underlying costs. For example, where an asset is required for the delivery of different types of services within Markets 4 and 5, the underlying valuation of this asset that feeds into the cost stack should be treated in a consistent way. In particular, different assets may have different costing approaches, but each asset across all products along the vertical supply chain should be treated in the same way to avoid distorting the ladder of investment and gaming of the regulatory accounting regime by the SMP operator.

In the steps to cost modelling and pricing approaches BEREC set out, the stage involving the determination of the appropriate cost annualisation method already incorporates an NRA's view of whether an asset is "replicable" or not. By the term "replicability" we understand this to relate to a view of whether the particular point in the vertical supply chain is contestable. Where an NRA believes there is the prospect for efficient entry, access prices should therefore be set so as to set efficient buy-or-build decisions. This suggests adopting the CCA approach to the valuation of assets (since this involves adjusting asset values to the replacement cost of a MEA).

On the other hand, where there are good reasons why entry by (more) competing access providers is unlikely[33] the NRA could be guided primarily by its other regulatory objective of consumer protection – that is, provided the wholesale prices permitted recovery of efficiently incurred costs and did not result in technological progress resulting in higher prices to consumers of existing services, that would be sufficient and could mitigate concerns regarding cost recovery.

While it is possible to use different annualisation methods for different assets, the key is consistency. Switching between these methods runs the risk of not enabling the SMP operator to recover its efficiently incurred costs (including those which are ex-post sunk), or risks undermining entry decisions or roll-out plans by entrants. The possibility of expropriating assets is a matter an NRA should take seriously, particularly in a world where it is trying to encourage investment that has yet to take place.

There is also a need to be aware of a straightforward application of the access prices derived from a costing methodology approach. If the results are out of kilter with current prices, this could introduce shocks and uncertainty into the market, which may undermine future investment.

[33] Cf. e.g. Ofcom's Valuing Copper statement in 2005. http://stakeholders.ofcom.org.uk/binaries/consultations/copper/summary/copper2.pdf.

A study by Frontier Economics[34] focuses on distinguishing between replicable and non-replicable assets and applying different costing methodologies to different asset classes. Their analysis is in part motivated by the experience in relation to utilities in the UK, in particular the water industry where underground assets are valued substantially below replacement cost. However, they do recognise that this approach could impact on investor expectation regarding further investment and that it could impact on customer incentives to adopt fibre.

Also, in applying the „utility" perspective to telecoms markets, Frontier does not consider the possible impact in terms of cross-platform competition and investment when writing down returns on some assets for fixed broadband access. In particular, overly aggressive reductions in legacy infrastructure asset valuations may harm the investment case for competing infrastructure operators. This would not go along well with the objective of the regulatory framework to promote infrastructure competition where feasible and to be technology neutral.

It also needs to be pointed out that there is a risk associated with the approach of a "realistic replicability" as it implies considerable judgement decisions by the NRA. Therefore clear criteria would be needed in order not to have an arbitrary approach. Further the "replicability" may change over time and may be different depending on competitive conditions (e.g. a duct that is used for both copper and fibre, with the latter the economic value of the duct changes and with this the original replicability assessment would have to be adjusted as well). For example there are cases where NGA roll-out is based on utilization of existing empty ducts, while there are some other cases where NGA roll-out is based on totally new trenching and ducting. The latter might be the dominant case for example in the last mile where most of the network is based on aerial, buried or non-reusable thin ducting (at least currently and in many countries). Thus an asset class may be considered non-replicable in one case and replicable in another. This may raise difficulties for practical implementation.

With regard to Question 13 BEREC would not consider this to be an "either-or" decision, but as pointed out above it depends on the situation faced by the regulator (the "box" a country is in) and CCA/LRIC can be suitable as can DCF.

Questions 15 MEA approach

Generally, the MEA is defined as the technology choice made by a new entrant (reference point) delivering a given service at lower costs than is currently the case with existing technology. Whether fibre is the MEA for copper depends on whether the value of fibre assets replacing copper assets results in lower costs. If not, then fibre, by definition would not be the MEA because it would not be the least cost technology available for the service in question. As fibre allows new services (or higher speeds) to also be delivered, then if fibre assets cost more than the copper assets they displace, this additional value needs to be abated.

Questions 16 Consistency along the value chain

This question is very much related to Q8 and in general BEREC is of the view that yes, the ladder of investment concept requires price consistency along the value chain, irrespective of whether we are in a copper or a fibre world.

[34] http://www.vodafone.com/content/dam/vodafone/about/public_policy/policy_papers/nga_costing_proposals.pdf commissioned by Vodafone, NZL.

V. Access prices fostering investment in NGA networks

Questions 17 – 21 Copper access prices and the incentives to invest in NGA networks

As stated in response to Question 1, BEREC believes that the vehicle for the delivery of the DAE targets could come in different forms: VDSL with bonding, phantoming and vectoring[35], cable, mobile as well as fibre technologies have the potential of delivering more than 24 Mbit/s broadband access that is currently available over copper. As such, explicit migration from copper to fibre may not be a necessary condition for reaching the DAE broadband targets. That is, other technologies should be taken into account when thinking about ways of delivering the 2020 targets. Furthermore demand need to increase to make a business case for operators where this is not yet the case as ultimately investments must be recouped from revenues achieved through selling high speed services to customers. Finally, incumbents will be pushed by pressure from competitors (be it from ULL, cable or mobile operators) to invest in fibre as can be seen in The Netherlands, Malta or more recently in Germany. In Romania the largest investment in fibre is undertaken by an alternative operator. Thus there is no need for an obligatory switch-off of the copper network and there are economic incentives to do so voluntarily either from the demand side or the supply side.[36] In terms of the risks involved if such migration is forced towards a predetermined path regardless of the specific characteristics and developments of a given market it might have the adverse effect of increasing the risk premia filtering in investment decision, because these may be distorted by policy targets. Besides, a mandatory shutdown would also most likely go beyond the powers of regulators.

Regarding the role of the copper and fibre prices on NGA investment, it depends on different factors. The impact of increasing or decreasing copper price is, in general, difficult to estimate. The effect depends, among the others, on: the actual state of development of NGA networks by the incumbent and competitors, the (potential) degree of access to incumbent's existing infrastructures by other operators, the degrees of cost-disadvantage that entrants may have with respect to the incumbent as well as demand side characteristics. These factors may change significantly among Member States, leading to different reactions by market players in terms of investment incentives. The price differential should therefore not be "manipulated" downwards or upwards as this risks distorting market developments rather than setting the efficient incentives to invest.

As also pointed out in the introductory remarks BEREC sees a danger in trying to steer prices in one or the other direction, but thinks they should be the result of the cost modelling process as described above, paying particular attention to what might be expected in a competitive market. Therefore BEREC does not follow the assumption – that seems to underlie Questions 19-21 – that lowering the copper access price below their costs as evaluated by NRAs is needed in order to reach the DAE targets. That is, copper prices should not be set

- artificially "low" as this would risk distorting investment decisions of alternative infrastructure operators that roll-out their infrastructure at current costs.[37] Furthermore this would work only with some sort of switch off obligation likely to go beyond the powers of NRAs; nor

[35] For example KPN is hoping to achieve an average of 150Mbit/s with those technologies. With bonding alone, it hopes to achieve an average of 40Mbit/s. VDSL2 technology today offers speeds of 30 Mbps over copper loops of around 800 - 900m. VDSL2 vectoring is said to deliver 100 Mbps over a 400m, see http://www.telecompaper.com/news/kpn-targets-45-of-dutch-broadband-market.

[36] See also below Q22/23.

[37] In Denmark TDC owns a copper- and a coax-network. Both are regulated, however due to technical issues the coax-network is less usable for third parties (currently no take-up of third party access). Hence, the NRA believes that if copper prices are significantly lowered, TDC might stop investing in copper and instead focus on coax where they are likely to experience less competition. In the longer run, this is likely to be harmful to competition.

- artificially “high” (including any sort of inefficiencies and stranded investment) as this would risk to benefit unilaterally the SMP operator squeezing out competitors, and would also be bad for consumers.

Instead, copper prices should be cost-oriented and would lie in between the two extrema. This would avoid “rent-seeking” from the incumbent operator. Summing up BEREC would not see that there is a “copper-price dilemma” as long as proper cost-orientation is applied.

During the transition period where there is investment in NGA using fibre, the relative prices of copper and fibre are important, as recognised in Commissioner *Kroes*’ speech[38]. This is because current applications can largely be delivered using lower speed copper broadband products. As such, there is competition between services delivered over copper and over fibre. So, if the price of services delivered over copper is “too high” it could reduce the copper operator’s incentives to invest in fibre and potentially lead to margin squeeze problems. On the other hand, if the price of services delivered over copper is “too low” consumers are not incentivised to switch to services delivered over fibre.

Where there is substitutability between copper- and fibre-based access products and investment is yet to occur in fibre, the key principle behind pricing is that it should give efficient investment signals to the potential fibre network operator, whether it be the incumbent copper network operator or an alternative provider. This means that prices should reflect underlying efficient costs, so that choices are made on price differences which reflect the underlying efficient cost differences between the alternative assets.

A useful yardstick for pricing from the perspective of consumer protection could be that existing customers taking up services that are currently available should not be made worse off as a result of fibre investment. For example, a 24Mbit/s service delivered using fibre should not be priced higher than the same service delivered using copper. The price premium of a service that could only be delivered using a fibre access network, e.g. 100Mbit/s broadband access, would then reflect the additional costs associated with rolling out the fibre network. This is sometimes known as “anchor pricing” approach which could be adopted (at least as temporal measure). Additionally, there are practical solutions to make this happen in a consistent cost-accounting system that includes both older and newer (NGA) investment. BEREC considers it important to have one consistent and transparent cost-accounting system that includes both older and newer (NGA) investment and avoids cross-subsidization. Also, if the costs for copper and fibre are set according to the same costing principles, this should ensure the transparency needed to make a decision to invest in one of them according to the demand.

Of course, it could be the case that the fibre network could deliver the copper-based services at lower cost, in which case the fibre-based product should be priced to reflect this, which would promote the take up of fibre. Therefore, the key to migration is not only the absolute level of the copper access price, but in the relative prices between copper and fibre. However, as recent publications show that effects of copper pricing on fibre roll-out are ambiguous, depending on a number of assumptions describing different investment schemes and competitive situations[39] BEREC is of the view that investment decisions should not be distorted by artificially changing the price differential in one or the other direction. BEREC therefore would caution against setting prices below or above costs as identified in the costing analysis. This approach is also likely to end up in micro-management of the regulator trying to adjust prices constantly whereas the process should be left to market players as is for example the case in Sweden and Denmark where fibre investment is mainly market driven.

[38] *Kroes*, Investing in digital networks. A bridge to Europe’s future“, Speech/11/623.
[39] Cf. e.g. the paper on „Access Pricing, Competition, and Incentives to Migrate From „Old“ to „New“ Technology” by *Bourreau/Cambini/Dogan*, Harvard Kennedy School RWP11-029, July 2011.

Without full knowledge of the way the market would react, manipulating the wholesale pricing of copper-based access products could lead to unintended consequences such as gaming of the incentive scheme or higher prices to existing consumers. Instead, what is important for investment incentives is price stability and regulatory certainty for business planning for both incumbents and entrants. This means having a consistent application of costing methodology that does not switch ("flip-flops") between alternative approaches over time and for different access products, but follows robust rules and is sustainable.

Question 18 Investment risk premium

BEREC likes to recall its Opinion on the draft NGA Recommendation of May 2010[40] where it was stated that
"BEREC also welcomes that the Commission has taken on board the ERG's suggestions of mentioning criteria to assess uncertainties to calculate the appropriate risk premia. BEREC considers that assessing the investment risk by taking account of the various uncertainties[3(ERG (09) 16rev3, June 2009)], rather than making an a priori classification of risk, is appropriate in order to calculate a risk-reflective premium of NGA roll-out that provides the necessary investment incentives. This approach implicitly generates distinctions in the risk assessment between different roll-out scenarios on a case by case basis by NRAs. Despite the general recognition of this approach Annex I [of the draft NGA recommendation] still keeps an a priori risk categorisation for different NGA roll-out scenarios. Accordingly we suggest the inclusion of wording from the Staff Working Document in the Recommendation along the lines of the following: "… investment risk should be rewarded by means of a risk premium incorporated in the cost of capital."[4(p. 20)]

BEREC considers that this is a valid approach to be maintained. In particular BEREC wants to emphasise that it is important that a risk premium is incorporated in the cost of capital and that the rate of return should be risk adequate.

Question 21 Reduction of copper access prices and incentives for fibre roll-out

BEREC notes that in a competitive market operators need to recoup investments from consumers. This may lead to retail price differentiation, i.e. ask for a "price premium" from early adopters. Thus an investment decision requires a sustainable business model. In addition, the average revenue per user (ARPU) is an important strategic factor for their business case[41]. Retail price differentiation according to service quality is one way to recoup the investment, i.e. higher quality products are priced higher compared to lower quality versions. At a low entry-level price, it could encourage take up. At the same time, the higher price could allow higher revenues to be generated. Together, they could justify the investment. As in a competitive market, market based mechanisms allowing for retail price differentiation[42] would usually come before special regulatory incentives (such as a risk premium) were to be applied.

The market model requires that operators take investment decisions based on a viable business model (a proper assessment of their business case), not because they are "subsidised". If there is no business case (e.g. in remote or less densely populated areas), other instruments such as state aid (or universal service funding) may be made available, but such issues should not be solved by setting regulated prices as it would not be in line with cost-

[40] BEREC (10) 25Rev1_final.
[41] Other factors influencing the business case are customer base and customer lifetime etc.
[42] See a general discussion of this issue in "Differential pricing and efficiency" By Hal Varian, 1996. http://outreach.lib.uic.edu/www/issues/issue2/different/.

orientation (Art. 13 AD) and may distort competition.[43] Furthermore it would also risk "picking the winner" as alternative infrastructure investment may be crowded out, this would neither be a technological nor a competitive neutral regulatory approach as foreseen in the regulatory framework.

Questions 22 – 32 Charge control for copper based access products

Questions 22/23 Parallel running / copper switch-off

In order for there to be infrastructure-based competition, there may be some duplication at certain points during the roll-out. In theory, overlaying one network with another to provide the same downstream services may not tally with the notion of static allocative or productive efficiency. However, in reality, roll-out of a new network cannot be expected to happen instantaneously but takes place gradually, thus the additional costs of having parallel networks have to be offset against the benefits of competition and innovation in the long run (dynamic efficiency). Furthermore, if it turns out that one network can be completely replaced by another in terms of its ability to emulate existing services, then commercial incentives are likely to encourage migration to the lower cost network.

An important issue concerns the treatment of transition costs due to the technological change between legacy and next generation networks. The length of the transition period can vary from country to country as it might be largely influenced by geography/topography factors. The treatment of these costs by NRAs also depends on the relative weights given to different regulatory objectives. The more the NRA favours the recovery of efficiently incurred costs the more it will tend to include a share of transition costs corresponding to the efficient transition costs in the asset base. On the other hand, the more the NRA favours the setting of efficient pricing signal on a forward looking basis the more it will tend to exclude transition costs from the asset base.

When considering transition costs, NRAs also face a trade-off between static and dynamic efficiency and a difficult trade-off between realistic and efficient costs. The simultaneous parallel running of two networks by the operator (the legacy one and the next generation one) may result in an inflated doubled asset base which may conflict with the regulatory objective to ensure static efficiency.

As stated earlier, where there is a need to migrate end users from one network to another during the transition period, the principles of economic efficiency suggests that migration should occur at minimum cost. Where an operator owns both the copper and fibre networks, once the latter is rolled out, it should be in their interest to migrate customers onto the new network at the lowest cost possible which points to a voluntary switch-off anyway. Furthermore, their original investment appraisal should have taken into account the timing and profile of customers that the operators can reasonably expect to migrate over, for example taking into account users' willingness to take up new services. Whilst it is unlikely that migration would be instantaneous due to the infrastructure and processes that need to be in place for migration to occur smoothly for the end user.

The extent of inefficiency from parallel running depends on the extent of technology specific fixed costs which are not common across the technologies. Where much of the fixed costs between copper and fibre access are common – such as duct, property (e.g. exchange buildings), cabinets and so on – the extent of inefficiency from parallel running will be reduced.

[43] In a recent comment letter the Commission herself pointed out the danger of "over"-using Art. 13 AD for an objective (in this case 'coverage') for which it is not intended in the first place. The Commission also recalled that rates should reflect efficient costs and that it is not in line with the Termination Rates Recommendation 2009/396/EC to grant higher rates in return for commitments to invest in certain areas. Cf. PL/2011/1204 of 05/05/2011.

In any case, current investment in fibre is carried out by two different groups: the copper access network operator (i.e. typically the SMP operator) and alternative operators (such as ULL, cable operators and utilities). For the SMP operator, it could temporarily be the economically efficient option to run both networks in parallel during the roll-out period, particularly if some customers continue to remain on the existing network. Furthermore, once the fibre-network is rolled out in particular areas it would be in the incumbents own financial interest to migrate customers over as quickly as possible.

However, a faster migration scenario imposed by an NRA could result in higher costs, for example, incurring CAPEX sooner rather than later will increase the NPV cost of the investment, having to employ more engineers to facilitate the switch and/or a greater advertising campaign to encourage customers to take up fibre could also raise costs. Due to the fact that there is likely to be substantial overlap between the copper and fibre access network a switch-off of copper may not lead to substantial reduction of costs.

An explicit copper switch-off strategy could also have a negative impact on competition. Specifically, the business for existing ULL operators who use the copper network could be undermined and their investments stranded. This is unlikely to be in the interests of consumers. The analysis above has shown that such an obligatory switch-off is difficult to implement due to the links with both wholesale and retail markets.

Moreover an obligatory switch-off would not be in line with regulatory framework, because it is a very intrusive measure and most likely goes beyond the powers of NRAs. Such an approach is a disruptive intervention which is unlikely to bring benefits to consumers, rather the opposite. The difficulties outlined by the Commission bring out clearly the flaws of such an obligatory switch-off that seems to create more difficulties than benefits and also is against consumers' rights to choose the services they want to use themselves. This would not solve the problem of a low take-up, but lower consumer benefits which is against the objectives of Art. 8 Framework Directive. Overall the proposed approach of a copper switch-off has more drawbacks than benefits. However, in case all market players agree on a voluntary switch-off, the NRA should not block it.

Question 29 is related to Questions 17-21 above as it concerns the relationship between copper and fibre prices.

Questions 30-32 Incentive pricing scheme and commitments

BEREC thinks that the proposed incentive pricing scheme is largely a theoretical solution which is not expected to work well in the market as this "carrot-and-stick" approach invites incumbents to game the commitments. Thus BEREC would expect adverse consequences. Furthermore it complicates regulation so much that it would not be manageable any more. The difficulties in practically implementing it would likely confuse investors.[44]

Concluding remarks

This response has highlighted the importance of NRAs' regulatory objectives and market circumstances in determining the costing methodology relevant to address the four regulatory situations identified appropriately. We have drawn attention to situations where – starting from the common cost standard of the efficiently incurred costs – common principles could be applied, and would support a wider application of them to achieve the common goal of the

[44] For an alternative market-based approach see also answer to Q21 above and for the risk of a "commitments pricing scheme" also Commission comments in case PL/2011/1204 (see above footnote 43).

single market. In particular, there is a large degree of commonality in the methodology and approach adopted for pricing copper-based access. This is likely the result of NRAs having developed them over a period of time and followed ERG CPs on regulatory accounting. The process of cost modelling and regulatory pricing must be seen as whole and it is important that the regulator takes the decision by going through the stages outlined above sequentially.

The treatment of fibre-based access is a topical issue at the moment, in terms of providing incentives for market-led investments as well as explicit objectives to reduce the "digital divide" within national boundaries. A regulatory approach should allow recovery of investments and avoid time inconsistency by the regulator, such as an opportunistic exploitation of sunk investments with long economic lives by flip-flopping between approaches over time. It must also be clear that market shocks should be avoided. Due to the long lifetimes of access network assets changes of costing methodology are difficult to implement. In cases where adjustments of the costing methodology are made after an economic analysis the set of pricing rules must be transparently communicated to all market parties in order to avoid regulatory uncertainty.

BEREC considers it important that NRAs are aware of the principle of regulatory predictability introduced with Article 8(5) of the Framework Directive, particularly during the transition period. One approach is to consider a longer regulatory period to provide stability that gives operators and investors the necessary confidence to build their business case and to undertake the investments required to fulfil the objectives of promoting broadband roll-out in line with take-up in Europe. Whilst it is important to have regulatory commitment in these circumstances, NRAs should also be aware of unduly fettering future decisions, particularly if there are alternative approaches that would result in the same outcome. In the case of cost recovery of NGA investment, strategies such as a differentiated pricing strategy for low and high end customers should be contemplated as the ARPU determines the business case decision of operators and investors. After all, investment costs must be recouped via the market, not via guaranteed regulated returns.

BEREC also notes that there are different aspects to the notion of consistency, e.g. within the same market over time, across different markets within a national market, and within same markets across different NRAs. As such a cross-sectional comparison of NRAs' approaches should be considered in the context of market conditions and regulatory objectives. Similarly, a comparison of markets should take into account the impact that regulatory change has on incentives to invest by both incumbents and entrants. Furthermore, the ladder principle is still applicable ("NGA ladder of investment") as is CCA/LRIC, the application of which achieves both the promotion of effective competition and efficient investment thus ensuring a competitive NGA roll-out.

Finally, the Framework Directive sets out that any Commission decision under Article 19(1) of Directive 2002/21/EC should be limited to regulatory principles, approaches and methodologies, and that it should not prescribe details which will normally need to reflect national circumstances, and it should not prohibit alternative approaches which can reasonably be expected to have equivalent effect.

Annex I **Detailed description of broadband markets across Europe**

Austria

Category	Description
Market circumstances	Nationwide copper based access network is being upgraded to VDSL, since liberalisation in 1997/98 half of the fixed line are not active any more (fixed mobile substitution). Cable operators are well established since beginning of liberalisation in larger cities. Substantial competition from mobile broadband (=> low retail prices => low margin for DSL alternative operators)
Regulatory and policy objectives	Technology neutral NGA roll-out and efficient investment State aid (30 Mio, 25 Mbps for all by 2013) Regulatory certainty and transparency
Regulatory instruments	SMP regulatory framework Regulation of market 4 (only copper) and 5 (only business customer, Retail Minus) Obligation for SMP operator for a Reference Offer for Virtual Unbundling in NGA-Areas Consistent wholesale pricing along the ladder of investment
Outcomes	Copper: minimum of RM and CCA-LRAIC FTTH: no regulation so far but Wholesale-Offer (VULA) on voluntary basis in the market
Market results	Broadband penetration (1. Qu. 2011 fix and mobile): 113% of households Market shares for retail market (fixed and mobile broadband access 1. Qu. 2011) • DSL SMP + alternative operator: 36 % • Cable: 14 % • Mobile: 50 %

Belgium

Category	Description
Market circumstances	Nationwide copper access network (ADSL coverage: 99% of the population) which is being upgraded to VDSL2 (76% of the households, target of 85% end 2013). Nationwide cable access network (88% of the population), largely upgraded to Eurodocsis 3. 28% of the broadband lines >=30 Mbps. No FTTH roll-out planned in the 3 coming years. 54% of the broadband subscribers purchase broadband as part of a bundle and 62% of the digital TV subscribers purchase this service as part of a bundle. Cable operators are considered to be SMP for retail broadcast services in their respective coverage areas. Infrastructure competition exists between copper and cable but deliver insufficient results (highly concentrated market, high prices and decline of Belgium in benchmarks regarding broadband penetration). Because of national circumstances (e.g. closure of the biggest MDF, difficult business case for SLU), WBA products will play a key role during the current regulatory period (2011-2014).
Regulatory and policy objectives	Promotion of competition (including on 3 play products) through wholesale products available on the two existing infrastructures (copper and cable). Regulatory certainty and transparency.
Regulatory instruments	The regulation of markets 4 and 5 was recently reviewed (July 2011) and the retail broadcast market was found relevant for ex ante regulation : • Market 4: undbundling at MDF level (copper only). Undbundling at streetcabinet level not imposed, notably because it is an impediment to implement new technologies as vectoring. • Market 5: access to all DSL products, including multicast functionality. • Cable: resale of analogue TV, access to digital TV platform and resale of broadband services.
Outcomes	• Copper: cost orientation for all markets 4 and 5 products, based on a bottom-up LRIC model (CCA, tilted annuities). These cost methodologies are currently under review. • Cable: retail minus pricing (methodology to be developed).
Market results	Broadband penetration: 30% of the population (eighth place in the European ranking). Market shares for the retail broadband market: • SMP operator: 47,5% • Cable (all companies together): 44% • DSL alternative operators: 8% • Other: 0,5% Retail broadcast market: cable companies hold 70% or more in their respective coverage areas.

France

Category	Description
Market circumstances	Nationwide copper based access network owned by the incumbent operator France Télécom Broadband market dominated by DSL (95% of broadband accesses, covers 99% of households). Today, operators invest in FttH networks and infrastructure-based competition advances. The French telecommunications market historically sees the existence of a single national fixed copper network owned by the incumbent operator France Télécom. Especially in the past, cable operators have played an important role in term of service based-competition. Nonetheless, as their networks only covered a limited part of the territory, these operators had to pass contracts with France Télécom in order to rent its infrastructure and extend their coverage; The market is dominated by DSL (95% of broadband accesses) which covers 99% of households. On the demand side, the broadband penetration rate on population, which stood at 32.9% in January 2011, is well ahead of the EU-27 average (26.6% in January 2011), thereby placing it in fourth position in the EU. On the supply side, innovation from operators is strong and steady: operators have industrialized their processes on broadband and achieved productivity gains; Currently, infrastructure-based competition advances as operators invest in FttH networks. France Télécom's civil engineering infrastructure of ducts and poles is intended to play an important role in the development of NGA networks within the country.
Regulatory and policy objectives	LLU extension over the country helped by local authorities' projects when needed; Long-term regulatory certainty and transparency on wholesale access tariffs during the transition period from copper to fibre, especially through smooth pricing evolution of LLU and civil engineering access products; NGA regulatory framework promoting: • a level-playing field as regards access to civil engineering for FttX rollout; • co-investment between operators in order to enable alternative operators to climb the ladder of investments and to create structural barriers against abuse of SMP; Infrastructure-based competition through the parallel deployment of several fibre local-loops in the densely populated areas (20% of total population) and infrastructure sharing of a single fibre local-loop in more sparsely populated areas (80% of total population).
Regulatory instruments	Regulation of Market 4 and 5 to be reviewed by the end of 2012 concerning fibre regulation. In November 2010, ARCEP adopted a decision setting the cost methodology for access charges to France Télécom's ducts. Symmetric regulation framework mandating sharing of in-building wiring (two decisions adopted by ARCEP for symmetric regulation of FTTH: for very densely populated areas in 2009 and for more sparsely populated areas in 2010).
Outcomes	Hybrid asset base + tilted annuities + FDC + cost orientation for bitstream,

	LLU and ducts access; Fibre unbundling to be introduced in 2012.
Market results	Broadband penetration on population was 32.9% in January 2011; Market shares in customers on the broadband and ultra-broadband retail market were end of March 2011 (confidential data). • SMP operator: 43% • Cable:5% • DSL alternative operators: 52% As of end March 2011, more than 50,000 buildings had been passed by at least one FTTH network (year to year increase of 50%) and 1 135 000 households were eligible for FTTH offers (year to year increase of 36%).

Germany

Category	Description
Market circumstances	The incumbent's nationwide copper based access network was deregulated in 1998 starting with the obligation for ex-ante regulated LLU. To date DSL remains the most wide spread broadband technology (88 % in 2010). While WBA still plays a minor role the reliance on copper LLU remains the most widely applied business model for alternative DSL operators (82 % of competitors DSL) Initially the cable market was largely fragmented in different network levels with numerous small companies having access to the retail level along the big network operators. Substantial investment in telecommunication activities, e.g. upgrade of bidirectional transport, was therefore delayed until the consolidation process, mainly driven by the three big regional cable operators, had made significant progress. Broadband competition via cable infrastructure only developed noticeably during the last four years. Concerning passive infrastructure, in contrast to the distribution segment a significant portion of the feeder segment's cable is deployed via ducts.
Regulatory and policy objectives	Promotion of infrastructure competition Technology neutral and efficient investment Regulatory certainty and transparency
Regulatory instruments	SMP regulatory framework with appropriate access products Regulation of market 4 (copper ex ante, fibre ex post) and 5 (ex post) Consistent wholesale pricing along the ladder of investment
Outcomes	Strict cost orientation with CCA LRIC based pricing
Market results	Broadband penetration (2010): 32% take-up of population (growth above EU average) Market shares for retail market (fixed broadband access 2010) • DSL SMP operator: 45 % • DSL alternative operators: 42 % • Cable: 11 % • FTTH and other: 1 %

Hungary

Category	Description
Market circumstances	nationwide copper based access network and > 84% coverage of cable network ➔ high network density in densely populated areas this nationwide copper network plus cable network means > settlement with 92% of households is covered by broadband (10 Mbit/s and up) roll-out of GPON FttH-network by SMP
Regulatoy and policy objectives	Promotion of infrastructure-based competition Technology neutral NGA roll-out and efficient investment Long-term regulatory certainty (3 years)
Regulatory instruments	SMP regulatory framework market 4: unbundling fiber and copper market 5: copper, cable and fiber on both markets backhaul network services
Outcomes	No separate price regulation for copper and fiber Market 4: LRIC CCA Market 5: RM (national bit stream access), LRIC (regional/local bit stream access)
Market results	Broadband penetration: 21% take-up of population Market shares for retail market (YH 2010, SMP information is confidential) SMP operators: 35-40%, • DSL alternative operators: 5-10%, • xDSL: 41% • Cable: 44% • FttB/H: 10% • WLAN: 5%

Italy

Category	Description
Market circumstances	Nationwide copper based access network, no cable operator although an alternative operator owns a fibre access network infrastructure (providing 10 Mbit/s BB services) This nationwide copper network plus fiber network means > 53% of households with broadband lines. FTTH: 2Milion households already passed at CPE by the fiber network of one alternative operator (15% is the take up rate service's on this infrastructure). Other authorized operators actually use regulated unbundling (5M lines) and bitstream (2M lines half of which are naked) wholesale access services on copper as main instruments of competition. From September 2010 the main alternative operator launched the first ultra broadband offer; in February 2011 the incumbent operator has been authorized by AGCOM to start commercial testing of his ultra broadband offer conditioned to a maximum number of 40000 customers and to the availability of a reselling wholesale offer. The incumbent operator plans to pass 3M households by Ultra broadband network by 2013 FTTH (78%), FTTC (21,7%), FTTB(0,28%) in 43 Italian municipality. Some public-private partnerships have been or are in order to be established for developing NGA infrastructures, in agreement with State Aid discipline in limited areas (municipalities, districts and regional areas). AGCOM will finalize the NGA regulatory framework by September/October 2011.
Regulatory and policy objectives	Technology neutral and promotion of efficient investment (provide correct signals to the market in terms of make or buy decisions) by private companies and municipalities. Long-term regulatory certainty and transparency.
Regulatory instruments	SMP regulatory framework Regulation of market 4 (copper LLU, fibre end-to-end service, duct access and dark fibre) and market 5 (copper and fibre bitstream)[45] Promotion of infrastructure competition ➔ consistent wholesale pricing along the ladder of investment
Outcomes	Regulation of market 4 and 5 (both copper and fibre).[46] Copper wholesale access services: network cap based on CCA-LRIC model in a consistent manner along the ladder of investment. NGA wholesale access services: CCA LRIC.1
Market results	Broadband penetration: 23% take-up of population Market shares for retail broadband market (SMP information is confidential) • SMP operator: 53,5% • FTTH: 2,3% (of all broadband lines) • DSL alternative operators: 2-20% (this includes FttH)

[45] Proposal under consultation for NGA regulation
[46] Proposal under consultation for NGA regulation (markets 4 and 5)

Lithuania

Category	Description
Market circumstances	The fixed broadband infrastructures/technologies: 7,6% CTV, 4% LAN, 33.5%xDSL, 43% FTTx, 11,7% Wireless (incl. WiFi and WiMax). Cooper based Unbundled access market (62.5% metallic twisted pairs, 26,7% FTTx, 10,8% others). LLU market structure: Incumbent has 97.8% of metallic twisted pairs, 99,1% FTTx, 5,5% of local unshielded twisted pair (UTP) and shielded twisted pair (STP) loops. copper based access network and 30,2% of FTTx. Low prices and strong competition in retail market. Incumbent owned and controls 90.3 % of all cable ducts and occupies 47.9% of dark fibre lines.
Regulatory and policy objectives	Technology neutral NGA roll-out and efficient investment Government is keen to ensure deployment of broadband in rural areasPro-motion of infrastructure competition Regulatory certainty and transparency
Regulatory instruments	SMP regulatory framework Regulation of market 4 (fibre, copper, dark fibre, UTP, STP, ducts). 5 market investigation not finished yet
Outcomes	Access, non-discrimination, transparency, accounting separation, price control obligations for copper and for access to fibre LLU and access to UTP and STP and access to other passive infrastructure. FDC based pricing for copper and price cap for fibre, UTP, STP and other passive infrastructure.
Market results	Broadband penetration: 21,6% take-up of population Market shares for retail market • SMP operator: 50% • Cable: 6-7% • DSL alternative operators, including FTTx: 40-45%

The Netherlands

Category	Description
Market circumstances	Nationwide copper based access network which is being upgraded to VDSL (development of pair bonding, vectoring and phantoming) and > 95% coverage of DOCSIS 3 cable network ➔ high network density This nationwide copper network plus cable network means > 95% of households has broadband (30 Mbit/s and up) Roll-out of P2P FttH-network (659k homes passed is > 10% of households passed, YE 2010) by SMP Reggefiber No ducts in the access network Because of high market share of cable, the unit cost for copper/FttH are relatively high compared to other countries
Regulatory and policy objectives	Technology neutral NGA roll-out and efficient investment No state aid, because lack of white areas (art. 87) Long-term regulatory certainty (more than 3 years) during transition period
Regulatory instruments	SMP regulatory framework Regulation of market 4 (unbundling fibre and copper) and 5 (only copper, but no charge control) Promotion of infrastructure competition ➔ market 5: no fibre regulation
Outcomes	FttH: price cap with CPI correction based on DCF-method over a period of 25 years Under national consultation and European notification: MDF: safety cap with CPI correction based on cap 2011 Legislation on replacing copper access by fibre to create a level playing field
Market results	Broadband penetration: 39% take-up of population Market shares for retail market (SMP information is confidential) • SMP operator: 40-45% • Cable: 40-45% • DSL alternative operators: 10-20% (this includes FttH)

Portugal

Category	Description
Market circumstances	ADSL is the main broadband Internet access technology, representing 50.6% of the total. Cable modem is used by 41.1% of fixed broadband customers. Customers using optical fibre (FTTH/B) represented around 7.2% of broadband customers. 60% of every new broadband customers (in net terms) took up this technology in the first quarter 2011. There are 1.47 million households cabled with optical fibre (FTTH/B) and 3.8 million households with accesses using the EuroDOCSIS 3.0 standard used by CATV operators to provide high speed services. It is estimated that about 59% of family households have access to at least one high-speed network. The main fixed operators have agreed with the Government in 2009 to roll out fibre networks to pass 1.5 million homes and businesses, which corresponds to around 1/3 of total premises and around 50% of principal homes passed.
Regulatory and policy objectives	Technology neutral NGA roll-out and efficient investment State aid in white areas Regulation in areas where there is no competition
Regulatory instruments	SMP regulatory framework. Markets 4 and 5 analyses are expected to be published soon. Market 4 Currently, there is no mandated fibre unbundling in Portugal. Portugal has an active reference offer for duct access and associated infra-structure (poles, man-holes, etc.), mandatory for PT. Market 5 Currently, there is no mandated bitstream over fibre in Portugal.
Outcomes	ANACOM's assessment of ducts and associated infra-structure prices was based on cost estimations, derived from the PTC's Cost Accounting System (a top-down, historic costs, FDC and ABC-type model). Costs for new services, which were not available at the cost accounting system, were estimated based on current costs, taking into consideration equipment and manpower costs and, when applicable, mark-ups for operating, maintenance and common costs were added.
Market results	Broadband penetration: 19.8% take-up of population Market shares for retail market • SMP operator: 40-50% • Cable: 35-45% • DSL alternative operators: 10-20% (this includes FttH)

Romania

Category	Description
Market circumstances	The incumbent's strategy for developing its NGA network is based initially on FTTC/FTTB+VDSL deployment and in later stages on FTTH based on GPON technology. So far, FTTH take-up is very limited. The leading retail broadband access provider in Romania started originally as a cable operator, migrated most of its cable access network to FTTB/UTP/FTP and FTTH network. Another cable operator started to invest in DOCSIS 3.0. Low LLU take-up because of alternative infrastructure roll-out
Regulatory and policy objectives	Technology neutral broadband penetration increase Use of state aid and EU funding for infrastructure roll-out in white areas (in process) Regulatory transparency and certainty (2 years) during the transition period
Regulatory instruments	SMP regulatory framework Regulation of market 4 (copper unbundling; no duct access or fibre unbundling) Market 5 not regulated due to effective competition and the regulation of market 4
Outcomes	Price regulation of copper based on CCA/LRAIC model
Market results	Fixed broadband penetration: 14% take-up of population Market shares for retail market • xDSL: 29% • Cable: 14% • FTTH: 3% • FTTB: 47% (estimation) • Other: 6%

Spain

Category	Description
Market circumstances	The incumbent's nationwide copper based access network was regulated starting with the obligation of LLU and bitstream access. To date DSL remains the most wide spread broadband technology (79.5 % broadband lines are based on xDSL technologies by 2010-Dec). While WBA still plays a minor role the reliance on copper LLU remains the most widely applied business model for alternative DSL operators (80 % of BB services based on DSL use LLU, 65% are fully unbundled). Cable market was largely fragmented at the beginning. Now we have 4 main operators, one providing services in much of the national territory with 70% of the active lines and 3 main regional operators with 25% of the active lines. We highlight the investment efforts made by cable operators: by 2010Dec, 72% coverage of DOCSIS 3.0. Concerning passive infrastructure, CMT imposed the obligation on the Spanish SMP operator to grant access to this part of the network, that implies a significant portion of deployment cost for alternative operators.
Regulatory and policy objectives	Promotion of infrastructure competition. Technology neutral and efficient investment. Regulatory certainty and transparency
Regulatory instruments	SMP regulatory framework with appropriate access products Highlines market 4. According to reference offers, SMP Operator is under extensive regulation for wholesale physical access, including ULL and passive infrastructures. Highlines market 5. SMP operator is under regulation for wholesale broadband access but only up to 30Mbit/s. Soft transition to Fiber: new VDSL nodes on the SMP network are under CMT authorization and there is an extensive regulation for replacing copper access by fibre (for the purpose of protecting operators using ULL). Symmetric access obligation for wire line in-building access (all operators, only for fiber).
Outcomes	Cost orientation with CCA FDC used for pricing regulated interconnection services: access, transit, origination and termination, including leased lines. In development CCA TD LRIC model (owned by operator) that will be used first for the adjustment of price of ULL and bitstream regulated services; the incumbent will present their first accounts under this TDLRIC model on Oct/Nov 2011, referring to year closed on 31st Dec2010. CMT Developing CCA BU LRIC model for new WBA services provided by SMP operator. This model will be used not only for pricing XDSL but also for FTTC and FTTH bitstream services CMT Developing CCA BU LRIC model for SMP operator, fixed access network only, for pricing regulated services not only over copper but also fiber-based. It is a Scorched node model.
Market results	Broadband penetration (2010): 22,6% take-up of population Market shares for retail market (fixed broadband access 2010Dec) • DSL SMP operator: 52,7 % • DSL alternative operators: 26,8 %

- Cable: 19,3 %
- FTTH and other: 1,2 %

Switzerland

Category	Description
Market circumstances	Nationwide copper based access network which is already upgraded to VDSL for 78% and planned being upgraded to cover 95% of households by the end of 2013. 85% of households covered by cable networks. Of this coverage 95% are broadband enabled and cable network operators are continuously upgrading to DOCSIS 3.0. The actual coverage isn't known publicly. The nationwide copper network plus cable network means that 98% of households has access to broadband (min. ADSL) Roll-out of P2P FttH-network (240k homes passed is about 7% of households passed, May 2011) Cable operators often have no ducts in the access network Only copper access lines are subject to (unbundling) regulation
Regulatory and policy objectives	No stand-alone national strategy for ultra-fast broadband, but the Federal Information Society Strategy is being updated during 2011 and will include broadband infrastructure aspects. Telecommunications law objectives: ensure that a range of cost-effective, high quality, and nationally and internationally competitive telecommunications services is available to private individuals and the business community (reliable universal service is provided, at affordable prices, for all sections of the population in all parts of the country; telecommunications traffic is free from interference and respects personal and incorporeal property rights; effective competition in the provision of telecommunications services; protect users of telecommunications services from unfair mass advertising and from abuse associated with value-added services)
Regulatory instruments	Universal Service Obligation: Broadband access (600kbit/s download, 100 kbit/s upload) is part of the universal service obligation Providers of telecommunications services that have a dominant position in the market must provide access to other providers in a transparent and non-discriminatory manner at cost-oriented prices in the following forms to their facilities and their services: fully unbundled access to the local loop fast bitstream access for four years rebilling for fixed network local loops interconnection leased lines access to cable ducts, provided these have sufficient capacity. They shall disclose the conditions and prices for their individual access services separately. Access to unbundled fibre lines is not subject to regulation. The regulator acts, however, on voluntary basis as a facilitator for FTTH cooperation agreements (round tables). This initiative led e.g. to technical standards for in-house-wiring
Outcomes	No price regulation or costing methodology for NGA applied.
Market results	Broadband penetration: 38% take-up of population Market shares for retail market (December 2010) • SMP operator: 55.5%

- Cable: 27.7%
- DSL alternative operators: 16.8%

Active fibre access lines amount to about 1% of all broadband access lines. No detailed public statistic available at the moment.

A lot of projects for fibre roll-out announced. Most are subject to a review by the competition authority because the roll-outs are planned in most of the cases as cooperations. The cooperations are mostly regional and between utilities and the telco incumbent Swisscom.

United Kingdom

Category	Description
Market circumstances	National copper based access network • BT in process of deploying NGA to approx. two-thirds of UK, mainly FTTC using VDSL with some FTTH particularly in new build scenarios. This area largely overlaps with cable network footprint in dense population areas Cable network covers approx. 50% of UK premises. Provides services at speeds up to 100Mb/s and trialling 200Mb/s access Other deployments • Currently several small FTTC and/or FTTH deployments in place or being developed • Plans of larger CPs to deploy super-fast broadband services still in development • State aid may play a role in rural areas where commercial deployment unlikely to occur • Co-existence of current and NGA networks for a significant period expected
Regulatory and policy objectives	Promote effective competition in provision of broadband services and efficient investment in deployment of NGA networks Government is keen to ensure deployment of super-fast broadband across UK Approach should provide long-term regulatory certainty and consistency between approaches to current generation and NGA products
Regulatory instruments	Market 4 • National market (plus the Hull Area) • Copper and fibre products in same product market • BT has SMP nationally. BT required to provide various products as remedies: o Copper via LLU and SLU remedies o Virtual Unbundled Local Access (VULA) via its NGA deployments o Passive Infrastructure Access (PIA) – access to ducts and poles o No fibre remedy is in place – due to no/very limited fibre used in the access network Market 5 • Copper and fibre products in same product market • Different geographic markets based on number of operators present o Market 1: Just BT o Market 2: BT plus 1 other or BT plus 2 others were BT's share greater than 50% o Market 3: BT plus 2 others where BT share less than 50% and BT plus three or more others • De-regulated in approx. 80% of UK due to presence of multiple operators using LLU, plus cable presence, in addition to BT
Outcomes	Market 4 • Charge control on copper (LLU). RPI-X calculated on CCA FAC basis • Cost orientation on PIA and SLU • No price regulation on VULA: o Intended to promote BT's investment through allowing some flexibility of wholesale pricing o Non-discrimination obligation interpreted strictly as Equivalence of Inputs (EOI) so that CPs get same products at same price as BT's

	downstream divisions
	Market 5
	• General remedies apply to copper and fibre products in other 20%
	  ○ But regulation dependent on serving exchange so change in network architecture when deploying FTTx networks is relevant
	• Charge control in Market 1 areas where BT is only provider
	  ○ Only applies to copper products up to 8Mb/s
	• Cost orientation in Market 2 areas where BT has SMP but limited other providers are available
	  ○ Applies to copper products only. RPI-X control, calculated using CCA FAC

Market results	Broadband penetration: 68% take-up of premises National market shares for retail market • BT: 28% • Virgin Media (Cable): 21% • DSL alternative operators: 51% • 39% via LLU • 12% via wholesale supply by BT Above figures include FTTC delivery by BT and all services provided by Virgin Media