Body of European Regulators for Electronic Communications

BEREC

BoR (17) 169

BEREC Report
Regulatory Accounting in Practice 2017

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1. Executive summary

This is the thirteenth RA annual report which summarises the findings of a detailed survey of regulatory accounting systems across Europe. Information has been gathered from National Regulatory Authorities (NRAs) and covers the implementation of regulatory cost accounting methodologies. It includes the state of play in terms of remedies of market regulation and focuses on price control, and the way in which it is defined in practice. The report provides also elements about structural parameters of each country and WACC methodologies applied by NRAs.

The document provides an up-to-date factual report on the regulatory accounting frameworks implemented by NRAs and an assessment of the level of consistency achieved. Where possible, trends and comparisons with data collected each year are illustrated.

The report focuses on the analysis on the Wholesale Line Rental (WLR) service and the following key wholesale markets: Wholesale Local Access (Market 3a), Wholesale Central Access (Market 3b) and Wholesale high quality access (Market 4). Moreover the cost base and allocation methodologies used for fixed (Market 1) and mobile (Market 2) termination markets are reported.[1]

Furthermore, as in last years' report, in order to include factors influencing NRAs regulatory strategy, additional structural data (e.g. population, market and competitive structure, infrastructure) have been collected from NRAs. Not surprisingly, differences in the market/competitive situation as well as infrastructure in place can be observed among responding countries, reflecting different external and technical requirements which NRAs need to take into account.

The report also looks at annualisation methodologies provided by respondent NRAs. As in last year's report, accounting information for some products in Market 3a, such as copper access (including LLU, SA, SLU), fibre access (LLU, VULA), dark fibre access and duct access have been further analysed.

The report includes an updated section on actual implementation of the Termination Rates Recommendation 2009/396 of 7 May 2009.

An evaluation of the implementation of the Recommendation 2013/466/EU on consistent non-discrimination obligations and costing methodologies is also presented (par. 3.6).

This year, the report provides an extended survey about WACC parameters focusing on market 3a. The WACC chapter summarises the main methodologies currently used by NRAs and sets out the reasons for selecting each of the parameters needed to evaluate the cost of capital under the CAP-M model.

1.1 Key findings

The overall picture of the cost accounting methodologies (chapter 3) is relatively stable in comparison to last year with just a small number of changes by NRAs since last year. There are clear preferences for price control methods (cost orientation alone or in combination with price cap, but the overall picture is getting more differentiated), cost base (current cost accounting – CCA) and allocation methodologies (mainly long run incremental costs (LR(A)IC) with fully distributed costs (FDC) preferred only in a few markets). The degree of consistent application of methodologies continues to be high and accommodates the use of elements or parameters that reflect national circumstances.

[1] The report takes into account the new version of the relevant market recommendation as adopted by the Commission on 9th October 2014 (2014/710/EU).

In the new RA annual report provides an analysis more oriented on single products (increasing the scope of monitoring). The 2017 report collects information on 19 main products (13 in 2015).

Cost orientation remains the most commonly used price control method and it is applied mainly for legacy products, while the Retail minus category, when chosen, refers mainly for VULA products or in market 3b.

ERT price control methodology in line with the Commission Recommendation (2013/466/EU), when chosen, is mainly applied for VULA products and NGA products.

The most frequent cost allocation approach is LRIC/LRAIC, almost for all products/markets. LRIC is the preferred approach specifically in termination markets. In access markets (market 3a) a preference for LRIC/LRAIC can be found. Whereas for duct access, FDC is the preferred approach in Market 4 and WLR. In Market 3b for legacy products both methods are used pretty evenly used. When LRAIC/LRIC is chosen as the main category, the most common approach is Bottom-up.

With reference to the asset base used in market 3a, a top down/accounting approach is still preferred to a bottom-up model.

The price control methodology chosen for ULL, SLU, FULL, seems related to the competitive situation in the broadband market. Data show more price flexibility of the SMP operator in case of stronger competition.

This cannot be observed in case of access to ducts where cost orientation is the most used approach seemingly independent of the competitive environment.

In retail markets, the accounting cost base (TD/accounting methods) is used as a main tool to apply price control obligations, for the few cases where NRAs still regulate market 1/2007. A top down asset base of the SMP operator seems to be more relevant in market 2_2007.

In termination markets, in line with the Commission Recommendation 2009/396/EC, a bottom up approach is more frequent, independent from the kind of price control in use.

The analysis of the main motivation behind the choice of the costing methodology showed that the “strict cost orientation” is the instrument of choice to promote competition and stimulate investments and increase consumer benefit.

The analysis of the structural data (chapter 4) confirms that countries start from very different points in terms of population, topography, market situation etc.. These factors influence the regulation strategy of NRAs for the wholesale access markets.

Regarding the WACC, the in-depth survey and the update provided in this report (chapter 5) shows that NRAs use the Capital-Asset-Pricing-Model (CAP-M)[2] and hence similar parameters for determining the WACC. However, the value of these parameters naturally differs reflecting different national financial market conditions and economic circumstances (e.g. inflation rates, tax rates), the timing of market reviews, and the sources of evidence used. There is no significant difference in the methodology used to estimate the WACC for fixed and mobile markets.

Overall the 2017 data confirms consistent approach to regulatory accounting approaches. The latter indicates that NRAs are providing predictable regulatory environments in their countries. The convergence of regulatory accounting approaches is more pronounced for the termination markets

[2] Cf. BoR (13) 110.

whereas we see a more differentiated picture for the wholesale access markets reflecting the different national market situations and structural factors influencing the regulatory strategy.

1.2 Future development

Good progress has been made in developing effective regulatory accounting frameworks to meet the needs of NRAs. However, this is a complex and highly technical topic which requires regular maintenance and enhanced implementation of the regulatory accounting framework as competition develops, technology improves and new regulatory challenges emerge.

2. Introduction

2.1 Background

The BEREC Regulatory Accounting EWG has been gathering and reporting data from National Regulatory Authorities (NRAs) with the aim of describing how regulatory accounting systems are implemented in European countries with respect to cost-orientation or non-discrimination obligations or to assist price control decisions. This is the thirteenth annual report summarising the results of the 2017 survey.

The report has been updated since 2005 in order to monitor trends in the degree of harmonisation of regulatory accounting systems across Europe.[3] By the end of the first quarter 2006 several countries had completed the first round of the market reviews for the 18 markets listed in the 2003 Recommendation; therefore it was possible to evaluate how various NRAs implemented the obligations provided for by articles 9-13 of the Access Directive (for wholesale markets), and the principles contained in the European Commission Recommendation on Cost Accounting and Accounting Separation of September 2005.[4] Subsequently, as the Commission issued the 2007 Recommendation that reduced the number of markets susceptible to ex ante regulation, the Report focused gradually on a lower number of markets and more recently on how NRAs implemented the principles of the Commission Recommendation on consistent non-discrimination obligations and costing methodologies.[5]

Generally speaking previous years' reports showed a clear trend towards an increasingly consistent approach to regulatory accounting approaches among NRAs.

2.2 Current report

This report provides an update on the status of regulatory accounting systems across Europe. It monitors how regulatory accounting methods have been developed as a consequence of the adoption by NRAs of decisions regarding market analyses. This year's report confirms the trend towards the consistent implementation of accounting methods and models already observed during the last few years.

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[3] - IRG (05) 24 Regulatory accounting in practice 2005.
- ERG (06) 23 Regulatory accounting in practice 2006.
- ERG (07) 22 Regulatory accounting in practice 2007.
- ERG (08) 47 Regulatory accounting in practice 2008.
- ERG (09) 41 Regulatory accounting in practice 2009.
- BoR (10) 48 Regulatory accounting in practice 2010.
- BoR (11) 34 Regulatory accounting in practice 2011.
- BoR (12) 78 Regulatory accounting in practice 2012.
- BoR (13) 110 Regulatory accounting in practice 2013.
- BoR (14) 114 Regulatory accounting in practice 2014.
- BoR (15) 143 Regulatory accounting in practice 2015.
- BoR (16) 159 Regulatory account in practice 2016.

[4] Recommendation 2005/698/EC replacing Recommendation 98/322/EC on Accounting Separation and Cost Accounting of 8 April 1998. In September 2005 the ERG published a Common Position containing "Guidelines on implementing the EC Recommendation 2005/698/EC", cf. document ERG (05) 29.

[5] The Commission worked on a new recommendation covering "Costing methodologies for key wholesale access prices". BEREC provided detailed input to the public consultation, cf. Document BoR (11) 65. Furthermore it submitted the BEREC Opinion on the draft recommendation on non-discrimination and costing methodologies on March 26th 2013, cf. Document BoR (13) 41. The Commission published the new "Recommendation on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment (2013/466/EU)" (C(2013) 5761) on 11 September 2013.

The report benefits from information collected from 34 authorities (listed in Appendix 1) with most NRAs responding to the majority of the questions, thus providing a solid base for further analysis.

The information provided in this report refers to those markets for which the market analyses are either concluded or under consultation. The report reflects, therefore, also measures which are planned to be implemented by the end of 2017, although the final decisions may still be subject to further consultations and may therefore still be part of the next market analysis rounds.

2.3 The data collection process

Under the regulatory framework of electronic communications, NRAs can, in principle, use a variety of appropriate regulatory accounting methodologies[6].

In order to obtain a general view of cost accounting systems across Europe, the Regulatory Accounting EWG has collected a broad range of data from NRAs.[7]
Over time the number of markets considered susceptible to ex ante regulation has reduced from 18 markets (Rec. 2003/311/EC) in 2003, to 7 in 2007 (Rec. 2007/879/EC) and 4 in 2014 (Rec. 2014/710/EC). Accordingly the analysis of the regulatory accounting monitoring process has been adjusted.
Although there are fewer markets now subject to ex ante regulation, the number of products in some markets has increased and products became more differentiated especially with the evolution of NGA networks. This change is reflected in the RA annual reports which provide an analysis more oriented on single products (increasing the scope of monitoring). The 2017 report collects information on 19 main products as reported in Figure 1 (13 in 2015)).

For each product/market the report will provide a picture of the application of the remedies set out in Art. 9 to Art. 13 of Access Directive[8] as follows:

Table 1 - Access Directive Art. 9-13

Article	Obligation
Art. 9	Transparency
Art. 10	Non-discrimination
Art. 11	Accounting separation
Art. 12	Access to and use of specific network facilities
Art. 13	Price control and cost accounting

[6] For an explanation of how to implement a regulatory accounting system see the ERG (05) 29 “Common position on EC Recommendation on Cost accounting systems and accounting separation under the regulatory framework for electronic communications” (2005/698/EC). Cf. also BEREC response to the Commission’s questionnaire on costing methodologies for key wholesale access products in electronic communications, BoR (11) 65.
[7] The full database contains confidential information and therefore is not published.
[8] Access Directive 2009/19/EC.

Table 2 – Market and products monitoring perimeter

Market/products		Sketched definitions
M1 2007		Access to the public telephone network at a fixed location for residential and non-residential customers.
M2 2007		Call origination on the public telephone network provided at a fixed location.
M1_2014_M3_2007		Wholesale call termination on individual public telephone networks provided at a fixed location
M2_2014_M7_2007		Wholesale voice call termination on individual mobile networks
Market 3a	M3a_2014_M4_2007_ULL	Local loop unbundling service on copper network
	M3a_2014_M4_2007_SLU	Sub loop unbundling on copper network
	M3a_2014_M4_2007_SA	Shared Access service on copper network
	M3a_2014_M4_2007_fiberLLU	Fibre Local loop unbundling
	M3a_2014_M4_2007_VULA	VULA on FTTx Network
	M3a_2014_M4_2007_DF	Dark fibre in access network
	M3a_2014_M4_2007_DA	Duct access on access network
Market 3b	M3b_2014_Access_Legacy	Access component of bitstream service on copper access network (from the central office until the CPE)
	M3b_2014_Access_NGA	Access component of bitstream service on FTTx access network (from the local central office until the CPE)
	M3b_2014_Backhaul_Legacy	Backhaul bandwidth component of bitstream service on copper access network (from a regional point of presence until the local central office)
	M3b_2014_Backhaul_NGA	Backhaul bandwidth component of bitstream service on FTTx access network (from a regional point of presence until the local central office)
Market 4	M4_2014_Active_Legacy	Terminating segment on legacy copper network
	M4_2014_Active_NGA	Terminating segment on FTTx network
	M4_2014_Passive	Access to passive infrastructure (dark fibre)
WLR		Wholesale Line Rental

Source: BEREC 2017

With reference to regulatory accounting methodologies a set of predefined options has been used in order to improve data comparability (as reported in the following) while providing a more detailed picture.

For the price control methodology in use the following categories and sub categories have been considered.

Table 3 - Price control categories and sub-categories

Price control Main category	Subcategory 1	Subcategory 2	Subcategory 3
Cost orientation	Cost orientation alone	Price cap alone	
Retail minus	Ex-ante traditional Margin squeeze test	ERT (Economic replicability test)	Fair and reasonable pricing
Benchmarking	Benchmarking in compliance with Rec. 2013/466/EU (access markets)	Benchmarking in compliance with Rec. 2009/396/EU (termination markets)	
Others/Combination			
No price control			

Source: BEREC 2017

The sub category “price cap” is included in the main category “cost orientation” as generally the evaluation of the productivity factor X, allowing for price flexibility, is derived taking into account to the incurred costs. For the purpose of this report, the two sub categories, Economic replicability test

(ERT) and Margin squeeze test (MS) are defined as in the following.[9] ERT is a "lighter" test providing more price flexibility to the SMP operator; moreover it deals with the relevant provisions of the Recommendation on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment 2013/466/EU. The traditional ex ante margin squeeze tests currently applied by NRAs mainly as a complementary tool, defines strict level of parameters within which NRAs presume that alternative operators have enough scope for fair competition, i. e. if these limits are passed a margin squeeze is found (i. e. the test failed) and the price setting of the SMP operator would be considered anti-competitive and thus forbidden.

With reference to the cost allocation methodology used to inform regulatory decisions, the following categories and sub categories have been set (see Figure 3).

Table 4 - Allocation methodology categories and sub categories

Main categories	Sub-categories
LR_A_IC	TD-LR(A)IC+
	BU-LR(A)IC+
LRIC	Pure LRIC
	TD-LRIC
	BU-LRIC
FDC	

Source: BEREC 2017

The main category distinguishes between the accounting approach (FDC/FAC) vs the modelling approach (TD/BU) including (LR_A_IC) or (LRIC) joint and common costs.

For the cost base used to inform regulatory decisions, the following categories and sub categories have been identified:

Table 5 - Cost base categories and sub categories

Main categories	Sub-categories
CCA	CCA-FCM
	CCA-OCM
HCA	
Others	

Source: BEREC 2017

The sub categories refer to the way in which the capital maintenance principle is applied when CCA is used as cost base. The two options are: i) CCA-FCM: the financial capital asset remains unchanged over the total asset life. In practical terms this means that the sum of the discounted annuity along the useful life of the asset should be equal to the capital expenditure; ii) CCA-OCM: the operating capital remains unchanged over the total asset life. In practical terms this means that every

[9] In continuity with Report BoR (14) 190

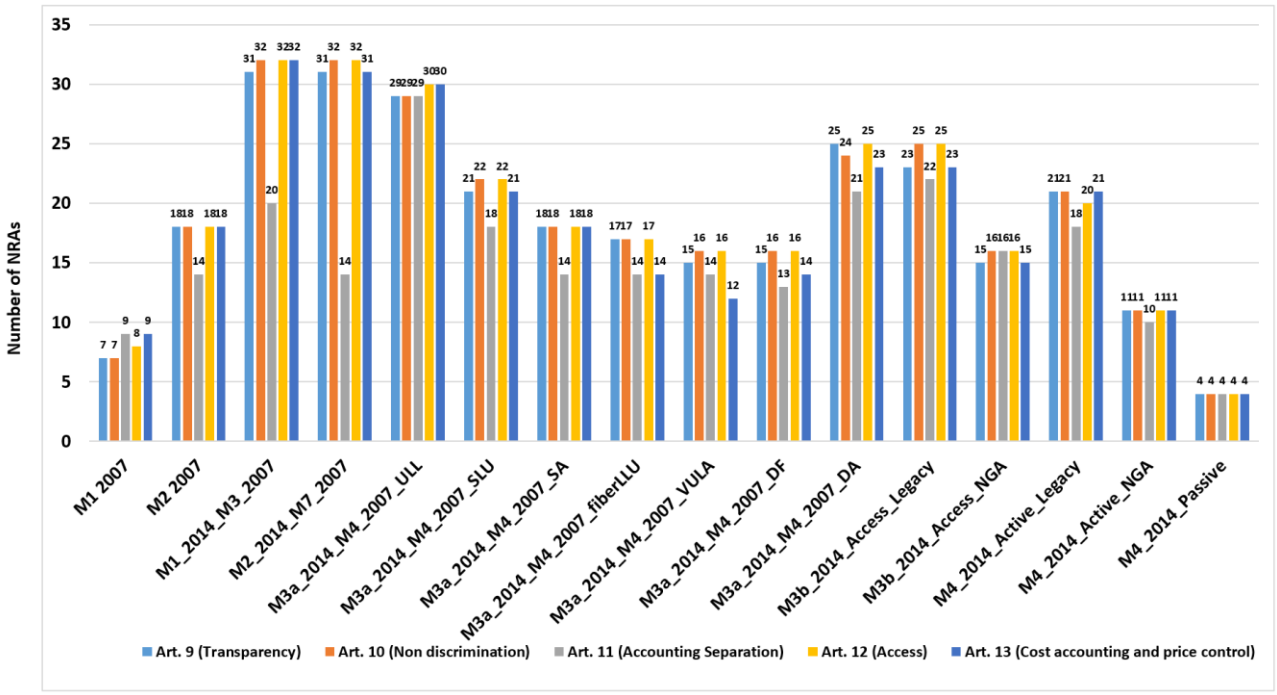
year a new asset base is evaluated according to a modern equivalent asset base and an annual cost is revalued independently from the capital asset which has already been depreciated. The FCM principle is relevant for the regulatory accounting obligation in case an FDC/TD (top down) approach is used for costs calculation. In a BU (bottom-up) approach all the assets are replaced by a new asset base independently from the depreciation previously incurred and in this sense, it can be considered closer to an OCM approach.

3. Outline of the Results

3.1 The remedy framework

Results of the application of art. 9-13 of the Access directive for each of the products included in the survey are reported in Figure 1 and shown in the following table by NRA.

Figure 1- Current legal basis of Art. 9-13 of Access Directive applied



	M1 2007	M2 2007	M1_2014_M3_2007	M2_2014_M7_2007	M3a_2014_M4_2007_ULL	M3a_2014_M4_2007_SLU	M3a_2014_M4_2007_SA	M3a_2014_M4_2007_fiberLLU	M3a_2014_M4_2007_VULA	M3a_2014_M4_2007_DF	M3a_2014_M4_2007_DA	M3b_2014_Access_Legacy	M3b_2014_Access_NGA	M4_2014_Active_Legacy	M4_2014_Active_NGA	M4_2014_Passive
Art. 9 (Transparency)	BE EL DE IE SI DK LT	BE DK HR HU LT RS CH EL ES IE NL MK DE FR IT LI PT UK	BE BG CH CY CZ DE DK EE EL ES FI FR HR HU IE IT LI LT LU LV MT NL NO PT RO RS SE SI SK MK UK	BE BG CH CY CZ DE DK EE EL ES FI FR HR HU IE IT LI LT LU LV MT NL NO PT RO RS SE SI SK MK UK	BE BG CH CZ DE DK EE EL ES FI FR HR HU IE IT LI LT LU LV NL NO PL PT RS SE SI SK MK UK	BG CH CZ DE DK EL ES FI FR HR HU IE IT LT LU LV NO PL SI SK UK	BE BG CZ DE DK EE FI FR HU IT LI LT LV NL NO PL SI SK	BG CZ DE DK EE FI HR HU LT LU LV NL NO PL SE SI SK	BG CZ DE EE ES HR IE LT LV NO PL SE SK MK UK	BG CZ DE DK EL FR HR LT NO PL HU IE IT LU LV MK	BG CZ DE DK EE ES FR HR HU IE IT LI LT LU LV NO PL PT RS SE SI SK MK UK	BE DK EE EL ES FI FR HR HU IE IT LI LT LU LV NO PL PT RS SI SK MK UK	DK EE EL HR HU IE LT LU LV SI SK	BE CH DE DK ES FR HR IE IT LT LU LV NL NO PL PT RO RS SI MK UK	DE FR HR IE IT LT LU LV PL PT SI	AT PL IE UK
Art. 10 (Non discrimination)	BE EL DE IE SI DK LT	BE DK HR HU LT RS CH EL ES IE NL MK DE FR IT LI PT UK	AT BE BG CH CY CZ DE DK EE EL ES FI FR HR HU IE IT LI LT LU LV MT NL NO PT RO RS SE SI SK MK UK	AT BE BG CH CY CZ DE DK EE EL ES FI FR HR HU IE IT LI LT LU LV MT NL NO PT RO RS SE SI SK MK UK	BE BG CH CZ DE DK EE EL ES FI FR HR HU IE IT LI LT LU LV NL NO PL PT RS SE SI SK MK UK	AT BG CH CZ DE DK EL ES FI FR HR HU IE IT LT LU LV NO PL SI SK UK	BE BG CZ DE DK EE FR HU IT LI LT LV NL NO PL SI SK	BG CZ DE DK EE FI HR HU LT LU LV NL NO PL SE SI SK	BG CZ DE HR IE LT LV NO SE SK MK UK	BG CZ DE DK EL FR HR HU IE IT LT LV NO PL PT MK	BG CH CZ DE DK EE ES FR HR HU IE IT LI LT LU LV NO PL PT RS SE SI SK MK UK	AT BE DE DK EE EL ES FI FR HR HU IE IT LI LT LU LV NO PL PT RS SI SK MK UK	AT EL ES IE IT NO PL DK EE HR HU LT LU LV SI SK	BE CH DE DK ES FR HR IE IT LT LU LV NL NO PL PT RO RS SI MK UK	DE FR HR IE IT LT LU LV PL PT SI	AT PL IE UK
Art. 11 (Accounting Separation)	AT BE EL HR LT DK IE LI SI	BE ES FR IE PT DK HR IT LI RS EL HU MK UK	AT BG CY CZ DK EL ES FI FR HR HU IE IT LI LV RS SE SI MK UK	BG CY CZ DK EL ES FI FR HU LV MT SE SI MK	BE BG CH CZ DE DK EE EL ES FI FR HR HU IE IT LI LT LU LV NL NO PL PT RS SI SK MK UK	AT BG CZ DK EL ES FR HR HU IE IT LT LU LV SI SK UK	BE BG CZ DK EE FR HU IT LI LT LV PL SI NO SK	BG CZ DK EE HR HU LT LU LV NO PL SE SI SK	AT BG CZ EE ES HR IE LT LV NO PL SE SK UK	BG CZ DK EL FR HR HU IE IT LT PL MK	BG CZ DK EE ES FR HR HU IE IT LI LT LU LV NO PL PT RS SE SI SK MK	AT BE DK EE EL ES FR HR HU IE IT LI LT LU LV PL RS PT SI SK MK UK	AT EL ES IE IT NO PL DK EE HR HU LT LU LV SI SK	BE DK ES FR HR IE LT LU LV NO PL PT RO RS SI MK UK	FR HR IE IT LT LU LV PL PT SI	AT PL IE UK
Art. 12 (Access)	BE EL LV DE DK IE LI SI	BE DK HR HU LT RS CH EL ES IE NL MK DE FR IT LI PT UK	AT BE BG CH CY CZ DE DK EE EL ES FI FR HR HU IE IT LI LT LU LV MT NL NO PT RO RS SE SI SK MK UK	AT BE BG CH CY CZ DE DK EE EL ES FI FR HR HU IE IT LI LT LU LV MT NL NO PT RO RS SE SI SK MK UK	AT BE BG CH CZ DE DK EE EL ES FI FR HR HU IE IT LI LT LU LV NL NO PL PT RS SE SI SK MK UK	AT BG CH CZ DE DK EL ES FI FR HR HU IE IT LI LT LU LV NO PL SI SK UK	BE BG CZ DE DK EE FI FR HU IT LI LT LV NL NO PL SI SK	BG CZ DE DK EE FI HR HU LT LU LV NL NO PL SE SI SK	AT BG CZ DE EE ES HR IE LT LV NO PL SE SK MK UK	BG CZ DE DK EL FR HR HU IE IT LT LV NO PL PT MK	BG CH CZ DE DK EE ES FR HR HU IE IT LI LT LU LV NO PL PT RS SE SI SK MK UK	AT BE DE DK EE EL ES FI FR HR HU IE IT LI LT LU LV NO PL PT RS SI SK MK UK	AT EL ES IE IT NO PL DK EE HR HU LT LU LV SI SK	BE CH DE DK ES FR HR IE IT LT LU LV NL NO PL PT RO MK UK	DE FR HR IE IT LT LU LV PL PT SI	AT PL IE UK
Art. 13 (Cost accounting and price control)	AT BE EL LV DK IE LI LT SI	BE DK HR HU LT RS CH EL ES IE NL MK DE FR IT LI PT UK	AT BE BG CH CY CZ DE DK EE EL ES FI FR HR HU IE IT LI LT LU LV MT NL NO PT RO RS SE SI SK MK UK	AT BE BG CH CY CZ DE DK EE EL ES FI FR HR HU IE IT LI LT LU LV MT NL NO PT RO RS SE SI SK MK UK	AT BE BG CH CZ DE DK EE EL ES FI FR HR HU IE IT LI LT LU LV NL NO PL PT RS SE SI SK MK UK	AT BG CH CZ DE DK EL ES FI FR HR HU IE IT LT LU LV SI SK UK	BE BG CZ DE DK EE FI FR HU IT LI LT LV NL NO PL SI SK	CZ DE DK EE FI HR HU LT LU LV NL PL SI SK	AT CZ DE EE ES HR IE LT LV PL SK MK	CZ DE DK EL FR HR HU IE IT LT LV PL PT MK	BG CH CZ DE DK EE ES FR HR HU IE IT LI LT LU LV NO PL PT RS SI SK MK	AT BE DK EE EL ES FR HR HU IE IT LI LT LU LV NO PL PT RS SI SK MK UK	AT EL ES IE IT LT LU LV PL SK EE HR HU LV SI	BE CH DE DK ES FR HR IE IT LT LU LV NL NO PL PT RO RS SI MK UK	DE FR HR IE IT LT LU LV PL PT SI	AT PL IE UK

Source: BEREC 2017

Figure 1 shows that not the same set of remedies is applied to each product. In general, accounting separation is often imposed together with the cost accounting obligation, and some NRAs consider that it is necessary to impose both of these obligations in order to ensure that robust regulatory accounting information is available for each product. The ratio is related to the fact that Accounting Separation could in this regard still be useful for vertically undertakings even when using cost models for price control, to prevent unfair cross-subsidy (e.g. if the result of the cost model is higher than the cost derived from the accounts of the SMP operator), and when the regulatory framework, in perspective, can become less intrusive (i.e. reducing regulatory burden such as cost orientation). Deviation from this approach is evident in termination markets where NRAs that have established prices through BU-LRIC models have in some cases removed the Accounting Separation obligation .

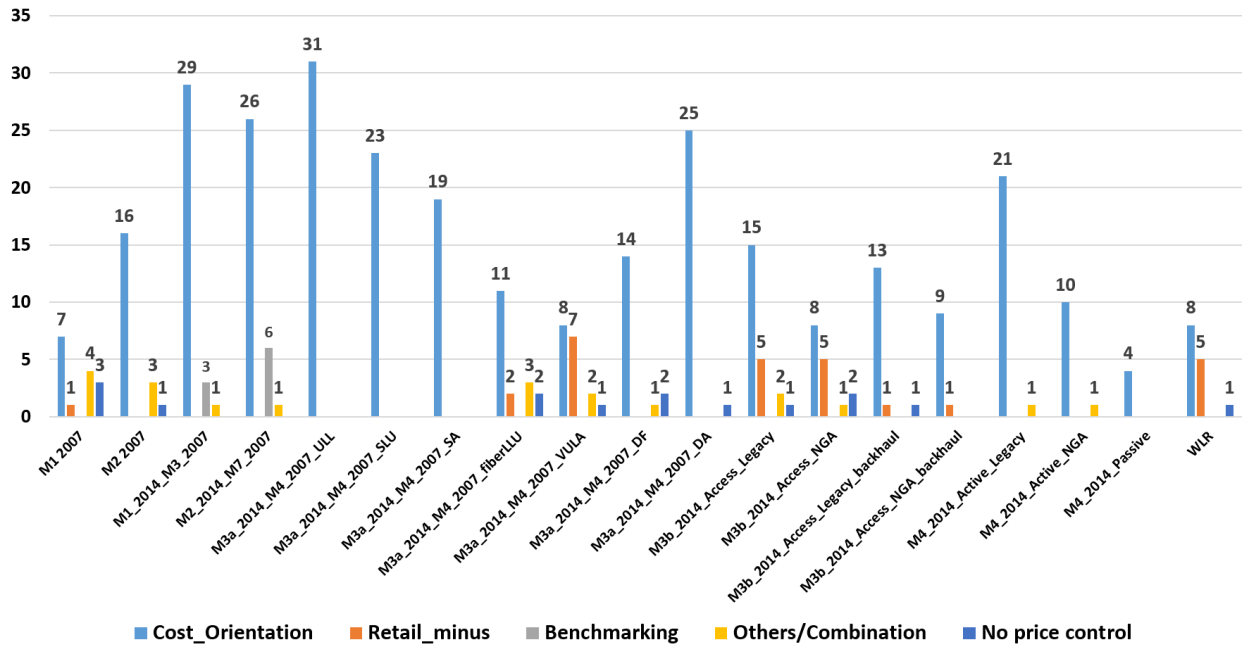
Some countries, that use ERT as a price control methodology, consider art. 13 of the access directive as legal basis. Other NRAs that have also imposed ERT as a price control methodology use only art. 10 (non-discrimination) as their legal basis. This is in line with the principle that the test must be made by the NRAs in light of the regulatory objectives to promote sustainable competition and efficient investment and it must be based on the specific competitive concerns identified in the market analysis.

However, also the opposite may be detected: art. 13 is imposed in some cases even if “No price control” is declared as a price control method. In this case art. 13 is required as legal basis to ensure that the cost orientation obligation may be tested ex-post without an explicit imposition of a price control methodology; in that case the general imposition of art. 13 as legal basis it is a tool to enforce the non-discrimination obligation and to ensure the availability of financial information on the regulated activity with the objective to provide certainty.

3.2 Price control methods

The following figures give an overview of the price control methods used to regulate markets and products (in line with main categories and sub categories previously reported).

Figure 2 - Price control main categories



	M1 2007	M2 2007	M1_2014_M3_2007	M2_2014_M7_2007	M3a_2014_M4_2007_ULL	M3a_2014_M4_2007_SLU	M3a_2014_M4_2007_SA	M3a_2014_M4_2007_fiberLLU	M3a_2014_M4_2007_VULA	M3a_2014_M4_2007_DF	M3a_2014_M4_2007_DA	M3b_2014_Access_Legacy	M3b_2014_Access_NGA	M3b_2014_Access_Legacy_backhaul	M3b_2014_Access_NGA_backhaul	M4_2014_Active_Legacy	M4_2014_Active_NGA	M4_2014_Passive	WLR
Cost_Orientation	DK EL LT LV LI RS SI	BE DE ES HU CH DK FR IE EL HR IT PT LI RS MK UK	AT BE BG CH CZ DE DK EL FI FR ES HR HU IE IT LT LU MT NL NO PT RO RS SE SI SK MK UK	AT BE BG CH CZ DE DK EL FI FR ES HR HU IE IT LU MT NL NO PT RO SE SI SK MK UK	AT BE BG CH CZ DE DK EE EL ES FI FR HR HU IE IT LI LT LU LV MT NL NO PL PT RS SE SI SK MK UK	AT BE BG CH CZ DE DK EE EL FR HU IE IT LI LT LU LV MT NL NO PL PT SE SI UK	AT BG CH CZ DE DK EL ES FI FR HR HU IE IT LT LU LV MT NO PL SI SK UK	BE BG CZ DE DK EE FI FR HU IT LI LT LV MT NL NO PL SI SK	DE DK EE FI HR HU LT LV NL PL SK	DK HR LT LV NL SK	DE EE IT LT PL SK	CZ DE DK EL HR HU IE IT LT LV NO PL PT MK	BG CH CZ DE DK EE ES FR HR HU IE IT LI LT LU LV NO PL PT RS SE SI SK MK UK	BE DK EE EL ES FR HR IT LI LT LV PL PT RS UK	DK EE EL HR IT LT LV PL	BE CY EE EL ES FR IE IT LT LV PL SI MK	DK EE EL ES IT LT LV PL SI	AT CH DE DK ES FR HR IE IT LT LU LV MT NL NO PL RO RS SI MK UK	AT DE HR IE IT LT LU LV PL SI	AT IE PL UK	ES DK FR IE IT LT LV UK
Retail_minus	HR							CZ SE	AT CZ EE ES IE MT NO SE			AT DE HU LU SK	AT HR ES HU LU SK	DE	IE				CH HR PL PT SI
Benchmarking			CY EE LV	CY EE LI LT LV RS															
Others/Combination	AT BE IE PL	LT NL PL	PL	PL				FR LU SI	MK UK	FR		IE SI	SI			BE	FR		
No Price control	FR HU UK	CY						BG NO	BG	BG MT	MT	FI	CZ NO	CZ					NO

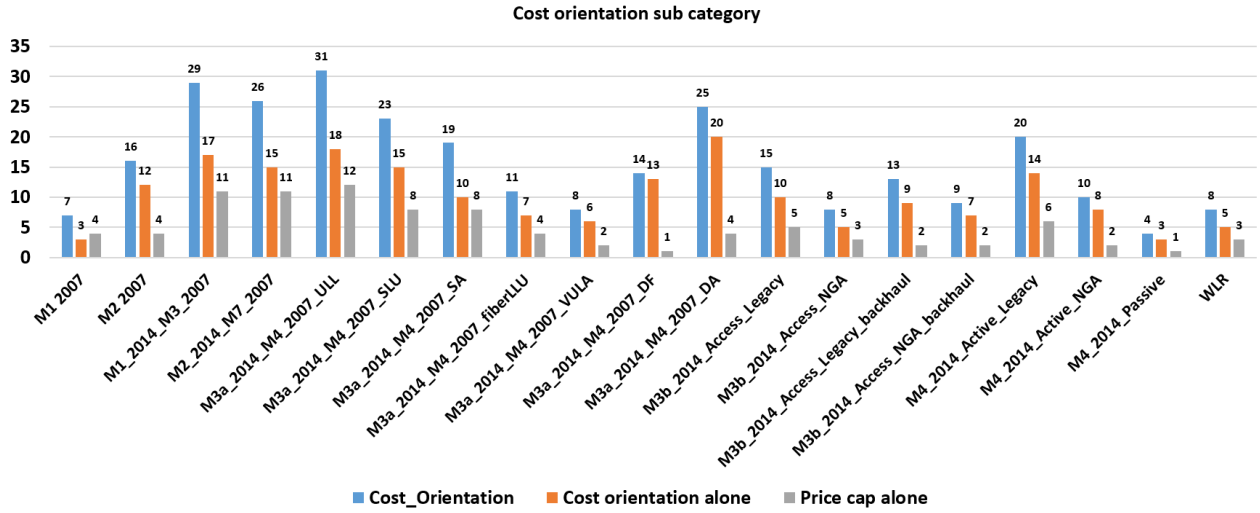
Source: BEREC 2017

The category “No price control” has been taken into account only when regulatory obligations are in force.

Figure 2 shows that cost orientation remains the most commonly used price control method and it is applied mainly for legacy products, while the Retail minus category has been chosen mainly for VULA products or in market 3b. No price control method is declared in some cases for NGA products and market 1.

With respect to sub categories, in Figure 3 it is observed that cost orientation alone is still the most frequent price control method used by NRAs, even in market 3b, with a stronger emphasis observed in case of duct access or dark fibre.

Figure 3 - Price control sub category Cost orientation

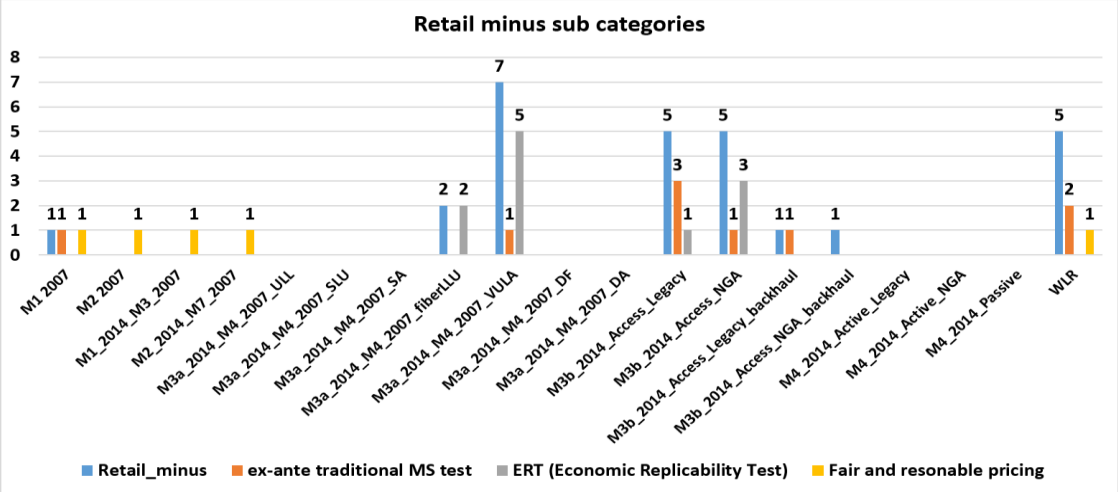


	M1 2007	M2 2007	M1_2014_M3_2007	M2_2014_M7_2007	M3a_2014_M4_2007_ULL	M3a_2014_M4_2007_SLU	M3a_2014_M4_2007_SA	M3a_2014_M4_2007_fiberLLU	M3a_2014_M4_2007_VULA	M3a_2014_M4_2007_DF	M3a_2014_M4_2007_DA	M3b_2014_Access_Legacy	M3b_2014_Access_NGA	M3b_2014_Access_Legacy_backhaul	M3b_2014_Access_NGA_backhaul	M4_2014_Active_Legacy	M4_2014_Active_NGA	M4_2014_Passive	WLR
Cost_Orientation	DK EL LI LT LV RS SI	BE CH DE DK EL ES FR HR HU IE IT LI PT RS MK UK	AT BE BG CH CZ DE DK EL ES FI FR HR HU IE IT LI LT LU MT NL NO PT RO RS SE SI SK MK UK	AT BE BG CH CZ DE DK EL ES FI FR HR HU IE IT LU MT NL NO PT SI SK MK UK	AT BE BG CH CZ DE DK EE EL ES FI FR HR HU IE IT LI LT LU LV MT NL NO PL PT RS SE SI SK MK UK	AT BG CH CZ DE DK EL ES FI FR HR HU IE IT LT LU LV MT NO PL SI SK UK	BE BG CZ DE DK EE FI FR HU IT LI LT LV MT NL NO PL SI SK	DE DK EE FI HR HU LT LV NL PL SK	DE EE HR IT LT LV PL SK	CZ DE DK EL HR HU IE IT LT LV NO PL PT MK	BG CH CZ DE DK EE ES FR HR HU IE IT LI LT LU LV NO PL PT RS SE SI SK MK UK	BE DK EE EL ES FR HR IT LI LT LV PL PT RS UK	EL DK EE HR IT LT LV PL	BE CY EE EL ES FR IE IT LT LV PL SI MK	DK EE EL ES IT LT LV PL SI	AT CH DE DK ES HR IE IT LT LU LV MT NL NO PL RO RS SI MK UK	AT DE HR IE IT LT LU LV PL SI	IE AT PL UK	ES DK FR IE IT LT LV UK
Cost orientation alone	EL LV RS	BE CH DE EL ES HR HU IE IT PT RS MK	AT BE CH DE EL ES FI HR HU IE IT PT MT RO RS SI MK	AT BE CH DE EL ES HR HU IE IT MT PT RO SI MK	AT BE CH DE EL ES FI HU IE IT LT LV MT PL PT RS SI MK	AT CH DE EL ES FI HU IE IT LT LV MT PL SI UK	BE DE FI HU IT LT LV MT PL SI	DE FI HR HU LT LV PL	HR DE IT LT LV PL	CZ DE EL HR HU IE IT LT LV NO PL PT MK	BG CH CZ DE ES FR HR HU IE IT LT LV NO PL PT RS SE SI MK UK	BE EL ES IT LI LT LV PL PT RS	HR EL LV IT PL	BE EL ES IT LT LV PL SI MK	EL ES IT LT LV PL SI	CH DE ES HR IE LT LV MT NO PL RO RS SI MK	HR DE IE IT LT LV PL SI	IE AT PL	IE ES IT LT LV
Price cap alone	AT DK LT SI	DK FR LT UK	BG CZ DK FR LT LU NL NO SE SK UK	BG CZ DK FI FR LU NL NO SE SK UK	BG CZ DK EE FR HR LU NL NO SE SK UK	BG CZ DK FR HR LU NO SK	BG CZ DK EE FR NL NO SK	DK EE NL SK	EE SK	DK	DK EE LU SK	DK EE FR HR UK	DK EE LT	EE FR	DK EE	AT DK IT LU NL UK	AT LU	UK	DK FR UK

Source: BEREC 2017

In figure 4 the retail minus sub categories are represented.[10]

Figure 4 - Price control sub category Retail minus



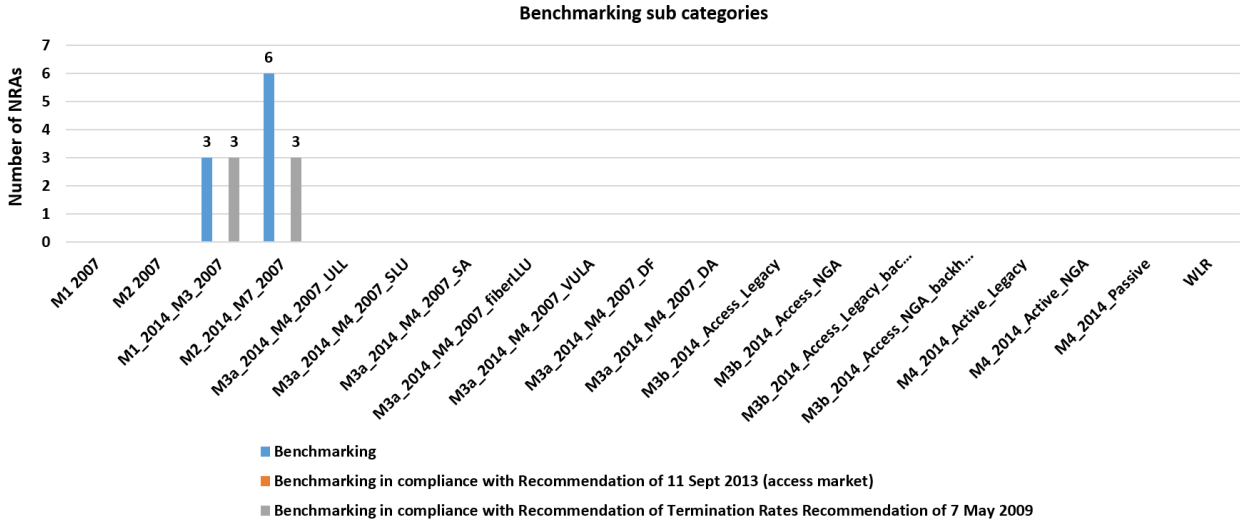
	M1 2007	M2 2007	M1_2014_M3_2007	M2_2014_M7_2007	M3a_2014_M4_2007_ULL	M3a_2014_M4_2007_SLU	M3a_2014_M4_2007_SA	M3a_2014_M4_2007_fiberLLU	M3a_2014_M4_2007_VULA	M3a_2014_M4_2007_DF	M3a_2014_M4_2007_DA	M3b_2014_Access_Legacy	M3b_2014_Access_NGA	M3b_2014_Access_Legacy_backhaul	M3b_2014_Access_NGA_backhaul	M4_2014_Active_Legacy	M4_2014_Active_NGA	M4_2014_Passive	WLR
Retail_minus	HR							CZ SE	AT ES MT SE	CZ IE NO			AT DE HU LU SK	AT ES HU LU SK	DE	IE			CH HR PL PT SI
ex-ante traditional MS test	HR								NO			AT DE SK	SK	DE					HR PT
ERT (Economic Replicability Test)								CZ SE	AT ES MT SE	CZ		LU	AT ES LU						
Fair and resonable pricing	PL	PL	PL	PL															CH

Source: BEREC 2017

In particular, the ERT price control methodology in line with the Commission Recommendation is mainly applied for VULA products and NGA products. An ex ante MS test is mainly applied for legacy standard services. The Benchmarking approach (figure 5) is only chosen for termination markets.

[10] When a sub category has not been declared standard “retail minus”, price control method is in charge.

Figure 5 - Price control sub category Benchmarking



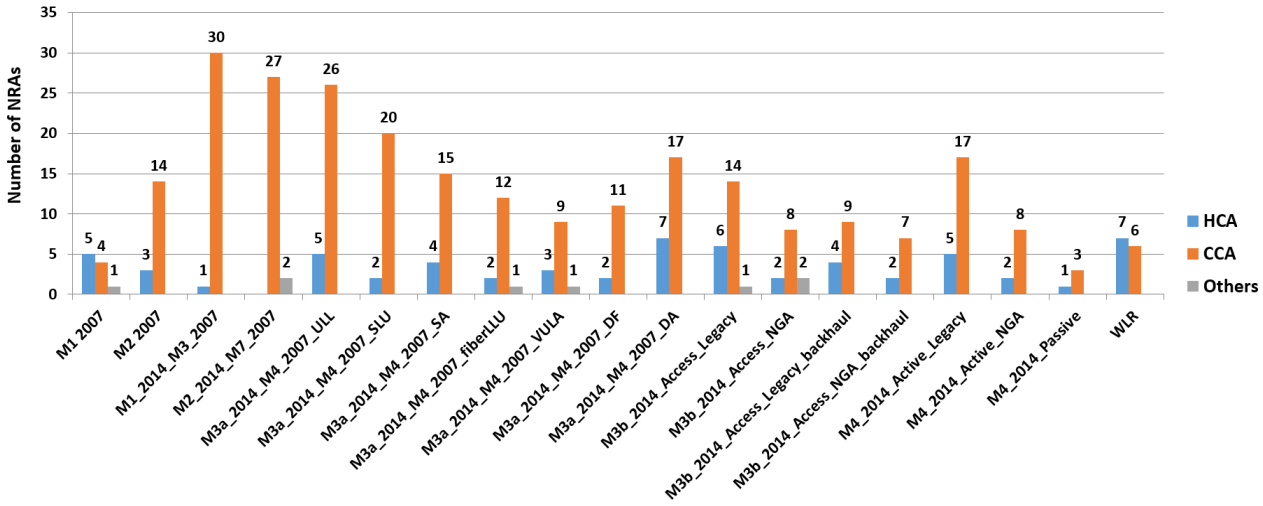
	M1 2007	M2 2007	M1_2014_M3_2007	M2_2014_M7_2007	M3a_2014_M4_2007_ULL	M3a_2014_M4_2007_SLU	M3a_2014_M4_2007_SA	M3a_2014_M4_2007_fiberLLU	M3a_2014_M4_2007_VULA	M3a_2014_M4_2007_DF	M3a_2014_M4_2007_DA	M3b_2014_Access_Legacy	M3b_2014_Access_NGA	M3b_2014_Access_Legacy_backhaul	M3b_2014_Access_NGA_backhaul	M4_2014_Active_Legacy	M4_2014_Active_NGA	M4_2014_Passive	WLR
Benchmarking			CY EE LV	CY EE LI LT LV RS															
Benchmarking in compliance with Recommendation of 11 Sept 2013 (access market)																			
Benchmarking in compliance with Recommendation of Termination Rates Recommendation of 7 May 2009			CY EE LV	EE LT LV															

Source: BEREC 2017

3.3 Cost base, annualisation and allocation methods

With reference to the cost base, Figure 6 shows that in 2017 Current Cost Accounting (CCA) is by far the most commonly used methodology for all markets. Market 1/2007 and WLR are exceptions, where Historical Cost Accounting (HCA) is frequently used.

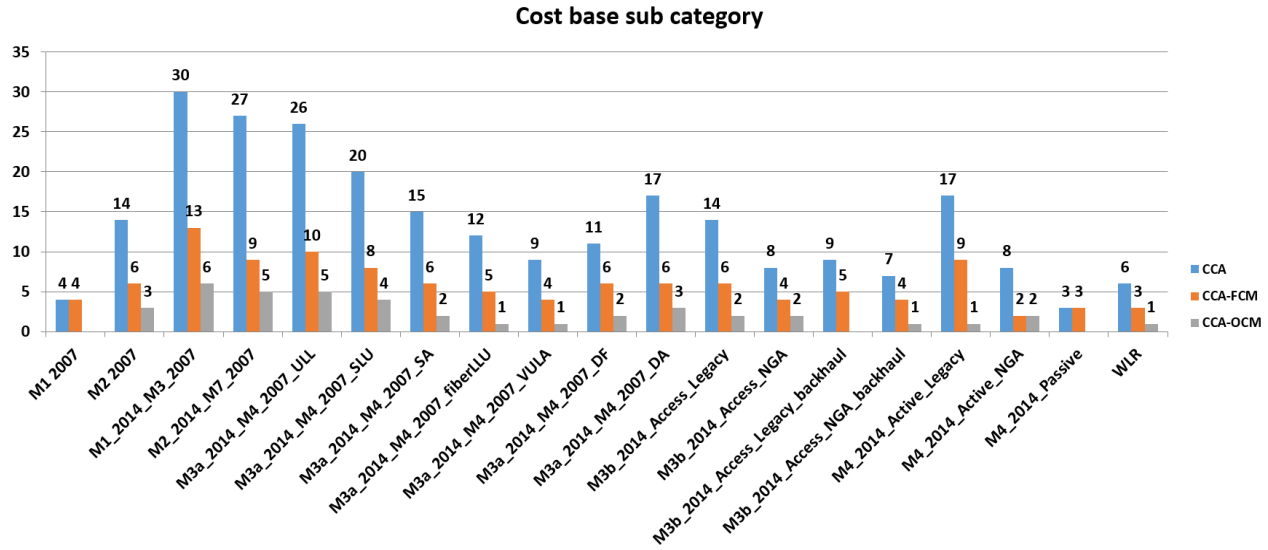
Figure 6 - Cost base used in 2017



	M1 2007	M2 2007	M1_2014_M3_2007	M2_2014_M7_2007	M3a_2014_M4_2007_ULL	M3a_2014_M4_2007_SLU	M3a_2014_M4_2007_SA	M3a_2014_M4_2007_fiberLLU	M3a_2014_M4_2007_VULA	M3a_2014_M4_2007_DF	M3a_2014_M4_2007_DA	M3b_2014_Access_Legacy	M3b_2014_Access_NGA	M3b_2014_Access_Legacy_backhaul	M3b_2014_Access_NGA_backhaul	M4_2014_Active_Legacy	M4_2014_Active_NGA	M4_2014_Passive	WLR
HCA	DK HR LI LT UK	LI LT PT	LI		EE LI LT MT PT	LT MT	EE LI LT MT	EE	AT EE LT	LT PT	ES LT NO PL PT	EE IE LI LT NO PT	EE	CY EE IE LT	EE	DK IT LT NO PT	LT PT	AT	CH DK HR IE LT PL PT
CCA	BE EL LV RS	BE CH DE DK EL ES FR HR HU IE IT RS MK UK	AT BE BG CH CY CZ DE DK EE EL FI FR HU IE IT LT LU MT NL NO PT RO RS SE SI SK MK UK	AT BE BG CH CZ DE DK EE EL ES FI FR HR HU IE IT LT LU MT NL NO PT RO SE SI SK MK	AT BE BG CH CZ DE DK EL ES FI FR HR HU IE IT LU LV NL NO PL RS SE SI SK MK UK	AT BG CH CZ DE DK EL FI FR HR HU IE IT LU LV NO PL SK SI UK	BE BG CZ DE DK FI FR HU IT LV NL NO PL SI SK	CZ DE DK FI HR HU LU LV NL PL SI SK	CZ DE HR HU LV MT PL SK UK	CZ DE DK EL FR HR HU IE IT LV PL	BG CH CZ DE DK FR HR HU IE IT LU LV RS SE SI SK UK	BE DK EL ES FR HR IT LU LV PL RS SI MK UK	DK EL HR IE IT LU LV PL SI	BE EL ES FR IT LV PL SI MK	DK EL ES IT LV PL SI	BE CH DE ES FR HR IE LU LV MT NL PL RO RS SI MK UK	DE FR HR IE IT LU PL SI	IE PL UK	ES FR IT LV SI UK
Others	SI			CY UK				SE	SE			SK	IE SK						

Source: BEREC 2017

Figure 7 - Cost base sub-categories



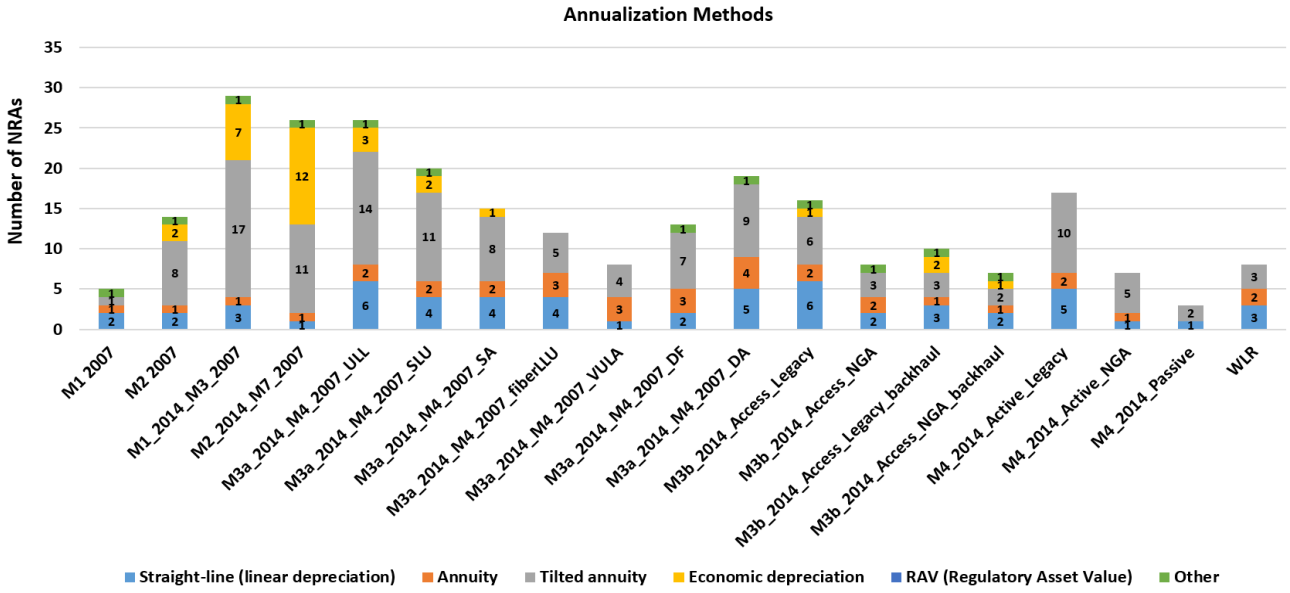
Source: BEREC 2017 (Not all NRas provide information on sub categories)

Within CCA categories, if a bottom-up cost model is used the cost base is often CCA-OCM (Operating Capital Maintenance), otherwise if regulatory accounting data (FDC) is used for pricing decisions, CCA-FCM (Financial Capital Maintenance) is the most frequently used approach for capital maintenance.

Annualisation methodologies within the CCA category[11] are represented in Figure 8. The most frequently used approach is the tilted annuity. Standard annuity and straight line follow. Economic depreciation is used mainly in termination markets.

[11] The following paragraph should be read taking into account that in the questionnaire this information has been asked only in case CCA methodology is chosen as main category.

Figure 8 - Annualisation methods

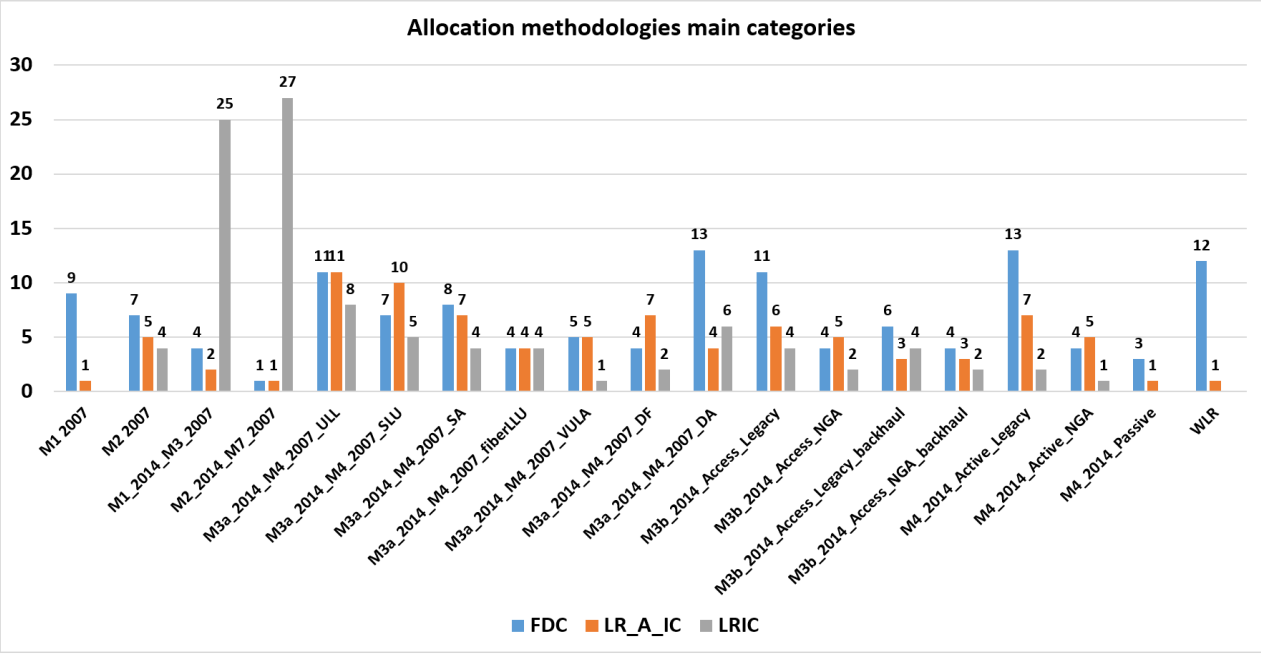


	M1 2007	M2 2007	M1_2014_M3_2007	M2_2014_M7_2007	M3a_2014_M4_2007_ULL	M3a_2014_M4_2007_SLU	M3a_2014_M4_2007_SA	M3a_2014_M4_2007_fiberLLU	M3a_2014_M4_2007_VULA	M3a_2014_M4_2007_DF	M3a_2014_M4_2007_DA	M3b_2014_Access_Legacy	M3b_2014_Access_NGA	M3b_2014_Access_Legacy_backhaul	M3b_2014_Access_NGA_backhaul	M4_2014_Active_Legacy	M4_2014_Active_NGA	M4_2014_Passive	WLR
Straight-line (linear depreciation)	RS SI	ES RS	CY FI RS	FI	BG FI HU NL RS UK	BG FI HU UK	BG FI HU NL	FI HU LU NL	UK	HU PT	BG HR HU RS UK	EE LI LU RS SI UK	LU SI	CY EE SI	EE SI	ES NL RS SI UK	SI	UK	ES SI UK
Annuity	LV	DE	DE	DE	DE LV	DE LV	DE LV	DE LV SI	DE IT LV	DE IT LV	DE IT LV SI	IT LV	IT LV	LV	LV	DE LV	DE		IT LV
Tilted annuity	BE	BE CH DK FR HR IE IT MK	BE BG CH CZ DK FR HR IE IT LT LU MT RO SE SI SK MK	BG CH CZ DK FR IT MT RO SI SK MK	BE CH CZ DK FR HR IE IT LU PL SE SI SK MK	CH CZ DK FR HR IE IT LU PL SI SK	BE CZ DK FR IT PL SI SK	CZ DK HR PL SK	CZ HR PL SK	CZ DK FR HR IE PL MK	CZ DK FR IE LU PL SE SK MK	BE DK FR HR PL MK	DK HR PL	FR PL MK	DK PL	BE CH FR HR IE LU MT PL RO MK	FR HR IE LU PL	IE PL	CH FR PL
Economic depreciation		HU UK	AT ES HU NL NO PT UK	AT BE EL ES HU IE LU NL NO PT SE UK	AT ES NO	AT NO	NO					ES		BE ES	ES				
RAV (Regulatory Asset Value)																			
Other	EL	EL	EL	CY	EL	EL				EL	CH	EL	EL	EL	EL				

Source: BEREC 2017

Figure 9 shows the main cost allocation methodologies used in each market.

Figure 9 - Cost Allocation methods



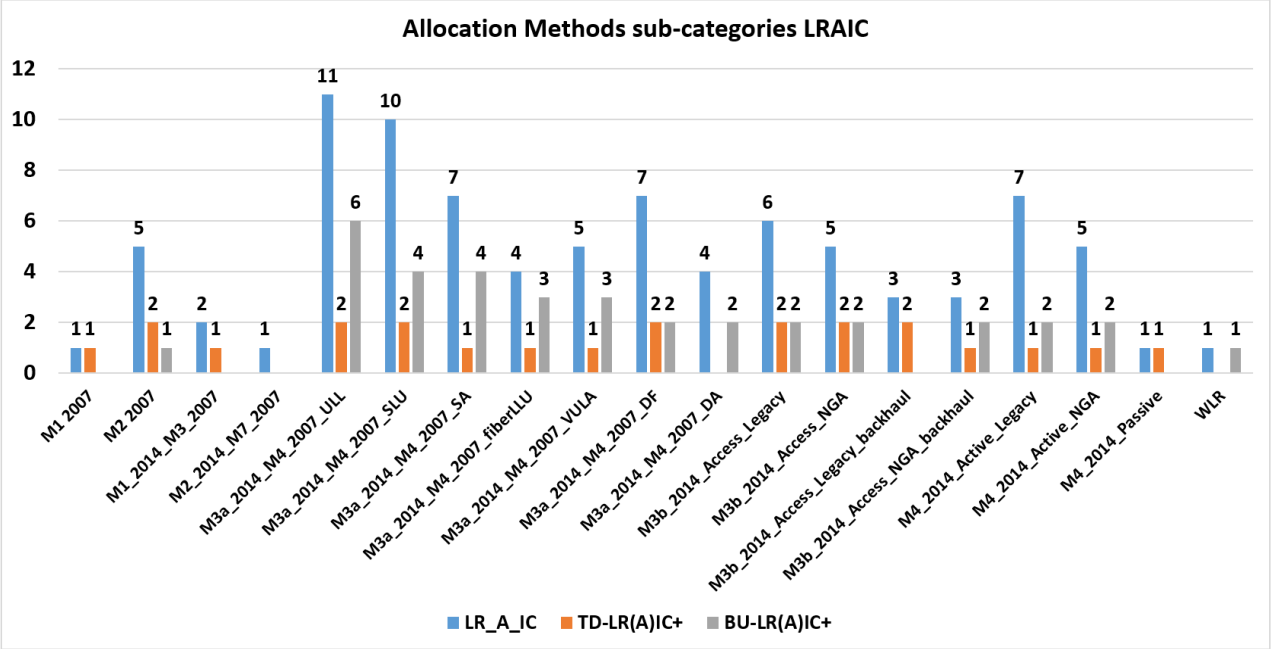
	M1 2007	M2 2007	M1_2014_M3_2007	M2_2014_M7_2007	M3a_2014_M4_2007_ULL	M3a_2014_M4_2007_SLU	M3a_2014_M4_2007_SA	M3a_2014_M4_2007_fiberLLU	M3a_2014_M4_2007_VULA	M3a_2014_M4_2007_DF	M3a_2014_M4_2007_DA	M3b_2014_Access_Legacy	M3b_2014_Access_NGA	M3b_2014_Access_Legacy_backhaul	M3b_2014_Access_NGA_backhaul	M4_2014_Active_Legacy	M4_2014_Active_NGA	M4_2014_Passive	WLR
FDC	BE DK HR LI LT LV RS SI UK	BE ES FR LI LT PT RS	BE FI LI RS	FI	BG EE FI FR LI LT LV MT PT RS UK	BG FI FR LT LV MT UK	BG EE FI FR LI LT LV MT	FI EE LT LV	AT EE LT LV UK	FR LT LV PT	BG EE ES FR HR LI LT LV NO PL PT RS UK	EE FR IE LI LT LV NO PT RS SK UK	EE LT LV SK	EE FR IE IT LT LV	EE IT LT LV	DK ES FR IE IT LT LV NL NO PT RS SI UK	IE LT PT SI	AT IE UK	CH DK ES FR HR IE LT LV PL PT SI UK
LR_A_IC	EL	CH EL HR IE IT	CH EL	CH	BE CH CZ DE DK EL HR IE IT NO PL	CH CZ DE DK EL HR IE IT NO PL	BE CZ DE DK IT NO PL	CZ DK HR PL	CZ DE HR IT PL	CZ DE DK HR IE PL	CZ DE DK IE	BE DK EL HR IT PL	DK EL HR IT PL	BE EL PL	DK EL PL	BE CH DE HR MT PL RO	DE FR HR IT PL	PL	IT
LRIC		DK HU MK UK	AT BG CY CZ DE DK EE ES FR HR HU IE IT LT LU MT NL NO PT RO SE SI SK MK UK	AT BE BG CY CZ DE DK EE EL ES FR HR HU IE IT LT LU MT NL NO PT RO SE SI SK MK UK	AT ES HU LU NL SE SI SK	AT HU LU SI SK	HU NL SI SK	HU LU NL SK	SK	HU IT	HU IT LU SE SI SK	ES LU SI MK	LU SI	CY ES SI MK	ES SI	LU MK	LU		

Source: BEREC

The most frequent cost allocation approach is LRIC/LRAIC, almost for all products/markets. LRIC is the preferred approach specifically in termination markets. In access markets (market 3a) a preference for LRIC/LRAIC can be found. Whereas for duct access, FDC is the preferred approach in Market 4 and WLR. In Market 3b for legacy products both methods are used pretty evenly used.

In figure 10 and 11 the sub categories of allocation methodologies are represented. When LRAIC/LRIC is chosen as the main category, the most common approach is Bottom-up. Where sub categories are not selected it generally means that a hybrid approach is in use.

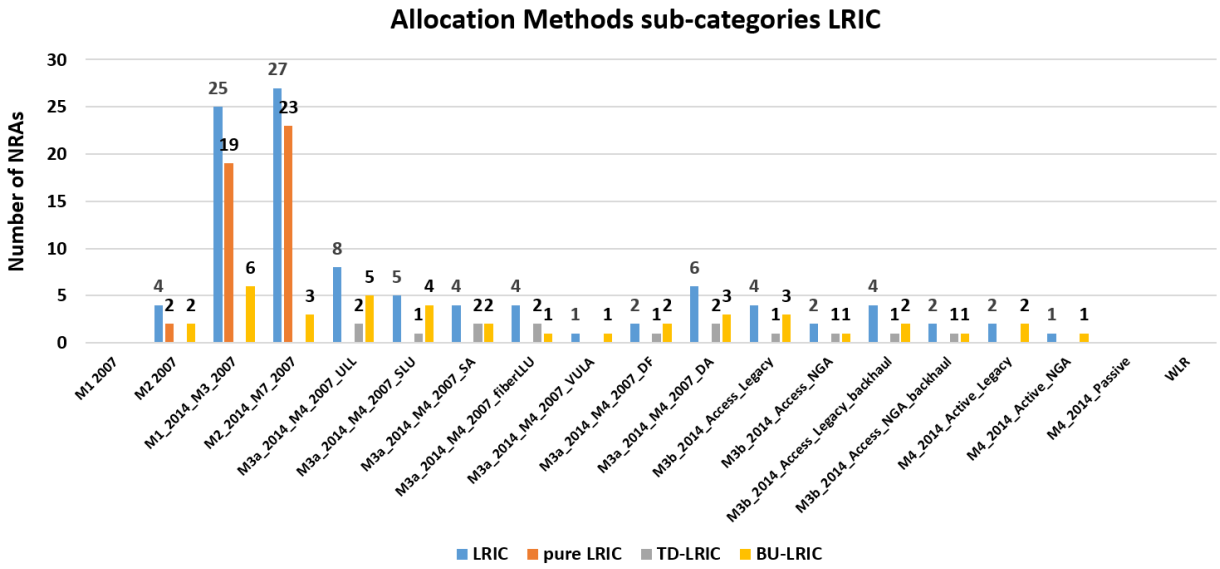
Figure 10 - Allocation methods LRAIC sub categories



	M1 2007	M2 2007	M1_2014_M3_2007	M2_2014_M7_2007	M3a_2014_M4_2007_ULL	M3a_2014_M4_2007_SLU	M3a_2014_M4_2007_SA	M3a_2014_M4_2007_fiberLLU	M3a_2014_M4_2007_VULA	M3a_2014_M4_2007_DF	M3a_2014_M4_2007_DA	M3b_2014_Access_Legacy	M3b_2014_Access_NGA	M3b_2014_Access_Legacy_backhaul	M3b_2014_Access_NGA_backhaul	M4_2014_Active_Legacy	M4_2014_Active_NGA	M4_2014_Passive	WLR
LR_A_IC	EL	CH EL HR IE IT	CH EL	CH	BE CH CZ DE DK EL HR IE IT NO PL	CH CZ DE DK EL HR IE IT NO PL	BE CZ DE DK IT NO PL	CZ DK HR PL	CZ DE HR IT PL	CZ DE DK EL HR IE PL	CZ DE DK IE	BE DK EL HR IT PL	DK EL IT PL	BE EL PL	DK EL PL	BE CH DE HR MT PL RO	DE FR HR IT PL	PL	IT
TD-LR(A)IC+	EL	EL HR	EL		EL PL	EL PL	PL	PL	PL	EL PL		EL PL	EL PL	EL PL	PL	PL	PL	PL	
BU-LR(A)IC+		IT			BE CZ DK HR IE IT	CZ DK HR IT	BE CZ DK IT	CZ DK HR	CZ HR IT	DK HR	CZ DK	DK IT	DK IT		DK EL	MT RO	FR IT		IT

Source: BEREC 2017

Figure 11 - Allocation methods LRIC sub categories



	M1 2007	M2 2007	M1_2014_M3_2007	M2_2014_M7_2007	M3a_2014_M4_2007_ULL	M3a_2014_M4_2007_SLU	M3a_2014_M4_2007_SA	M3a_2014_M4_2007_fiberLLU	M3a_2014_M4_2007_VULA	M3a_2014_M4_2007_DF	M3a_2014_M4_2007_DA	M3b_2014_Access_Legacy	M3b_2014_Access_NGA	M3b_2014_Access_Legacy_backhaul	M3b_2014_Access_NGA_backhaul	M4_2014_Active_Legacy	M4_2014_Active_NGA	M4_2014_Passive	WLR
LRIC		DK HU MK UK	AT BG CY CZ DE DK EE ES FR HR HU IE IT LT LU MT NL NO PT RO SE SI SK MK UK	AT BE BG CY CZ DE DK EE EL ES FR HR HU IE IT LT LU MT NL NO PT RO SE SI SK MK UK	AT ES HU LU NL SE SI SK	AT HU LU SI SK	HU NL SI SK	HU LU NL SK	SK	HU IT	HU IT LU SE SI SK	ES LU SI MK	LU SI	CY ES SI MK	ES SI	LU MK	LU		
pure LRIC		DK HU	AT CZ DE DK EE ES FR HU IE IT LT LU MT NO RO SE SI SK UK	AT BE CZ DE DK EE EL ES FR HU IE IT LT LU MT NO PT RO SE SI SK MK UK															
TD-LRIC					HU NL	HU	HU NL	HU NL		HU	HU SI	SI	SI	SI	SI				
BU-LRIC		MK UK	BG CY HR NL PT MK	BG HR NL	AT ES LU SI SK	AT LU SI SK	SI SK	SK	SK	CZ IT	IT LU SK	ES LU MK	LU	ES MK	ES	LU MK	LU		

Source: BEREC 2017

NRAs were also required to provide details on the treatment of fully depreciated assets. In general, it can be said that in countries where FDC is used, fully depreciated assets are excluded from the cost base, since their value has already been recovered through past depreciation, or otherwise because there is no mechanism to control whether there are depreciated assets used by the SMP operator. Alternatively, assets may show a zero value in the financial accounting system or are replaced by new assets using the estimated lifetime of the new asset.

3.4 Combination of price control methods/cost base/allocation methods and motivation

To obtain a more accurate picture of the approach used by NRAs on regulatory accounting methodologies it is interesting to analyse how price control and costing methodologies are applied in combination and in relation with main indicators of the competitive situation.

Figures in this section will provide a view of relationships between price control methodologies and applied costing methodologies. For this analysis, sub categories classified as LRAIC (TD), LRIC (TD) and LRAIC (BU), LRIC (BU) have been grouped together.[12]

A focus is set on the following combinations of price control and cost accounting methodologies:

Table 6 - Price control and costing methodologies

Price control and costing methodologies take into account
Cost orientation Alone/LRIC-LRAIC (BU)/CCA
Cost orientation Alone/LRIC-LRAIC (TD)/CCA
Cost orientation Alone/Pure LRIC/CCA
Cost orientation Alone/FDC/CCA
Cost orientation Alone/FDC/HCA
Price cap/LRIC-LRAIC (BU)/CCA
Price cap/LRIC-LRAIC (TD)/CCA
Price cap /Pure LRIC/CCA
Price cap/FDC/CCA
Price cap/FDC/HCA
ERT/LRIC-LRAIC (BU)/CCA
ERT/LRIC-LRAIC (TD)/CCA
ERT /Pure LRIC/CCA
ERT/FDC/CCA
ERT/FDC/HCA

The representation aims at examining if there is a relation between the way price control is related to costing methodologies applied in different products/markets (e. g. if NRAs base their pricing decisions upon data derived from a regulatory accounting system such as a TD model or an FDC approach or based on a bottom-up model). Moreover, it is relevant to understand if costing methodologies are influenced by the price control methodology or if they are chosen by NRAs for other reasons. The most frequent approaches and the effective level of harmonization are investigated. For each group of services the main motivations behind NRAs regulatory choices are described (according to a list of predefined options):

[12] In the figures in this section NRAs that don't provide information on sub categories are not represented. For this reason the number of NRAs may be different from the number of those that have provided information in the previous paragraph.

Table 7 - List of predefined motivation options

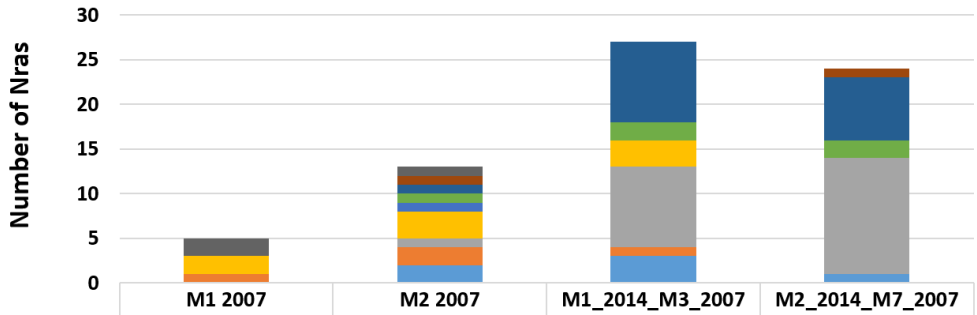
Predefined option on motivations
Promote strict cost orientation
Promote infrastructure replicability
Avoid unit cost increase
Provide visibility
Avoid margin sqeeze
Being in line with EU Average
Others (please comment)

The analysis in the next section provides a deeper insight into the level of harmonisation between NRAs, taking into account combinations of price and costing methodologies. Differences may arise due to specific country conditions and represent the reactions of NRAs to different competitive conditions in relevant markets. They represent the "fine tuning" of regulatory instruments used in order to address different competitive situations made available by the framework. This indicates that regulatory accounting has become more sophisticated over time, adjusting to more complex market situations.

3.5 Retail and interconnection markets

In Figure 12 the combination of costing methodology and price control approaches is represented for the retail and the interconnection market (only combinations with at least one record are shown).

Figure 12 - Combination price control / costing methodologies (M1 and M2)



	M1 2007	M2 2007	M1_2014_M3_2007	M2_2014_M7_2007
Price cap/FDC/HCA	2	1	0	0
Price cap/FDC/CCA	0	1	0	1
Price cap /Pure LRIC/CCA	0	1	9	7
Price cap/LRIC-LRAIC (BU)/CCA	0	1	2	2
Cost orientation Alone/FDC/HCA	0	1	0	0
Cost orientation Alone/FDC/CCA	2	3	3	0
Cost orientation Alone/Pure LRIC/CCA	0	1	9	13
Cost orientation Alone/LRIC-LRAIC (TD)/CCA	1	2	1	0
Cost orientation Alone/LRIC-LRAIC (BU)/CCA	0	2	3	1

Source: BEREC 2017

In relation to the asset base currently applied in markets where a price control obligation is in charge, the following can be summarized:

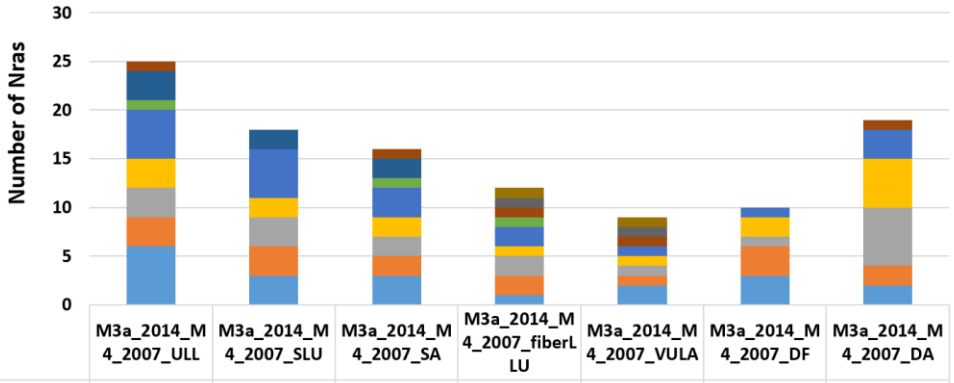
- In retail markets, the accounting cost base (TD/accounting methods) is used as a tool to apply price control obligations, for the few cases where NRAs still regulate market 1/2007. The asset base of the SMP operator seems to be more relevant in market 2_2007.
- In termination markets, in line with the Commission Recommendation 2009/396/EC, a bottom up approach is more frequent, independent from the kind of price control in use.

	M1 2007		M2 2007		M1_2014_M3_2007		M2_2014_M7_2007	
	BU	TD/ accounting methods	BU	TD/ accounting methods	BU	TD/ accounting methods	BU	TD/ accounting methods
Cost orientation alone	0	3	3	6	12	4	14	0
Price cap	0	2	2	2	11	0	9	1
ERT	0	0	0	0	0	0	0	0

3.5.1 Market 3a

In Figure 13 the combination of costing methodologies and price control approach is represented for products in market 3a (only combinations with at least one record are shown). There seems to be no clear preference of costing methodologies in relation to the kind of price control in use.However, looking at the main product market (ULL), we see that most NRAs apply a price cap/LRIC-LRAIC/CCA or a cost orientation alone/LRIC-LRAIC/CCA approach.

Figure 13 – Combination price control / costing methodologies (M3a)



	M3a_2014_M4_2007_ULL	M3a_2014_M4_2007_SLU	M3a_2014_M4_2007_SA	M3a_2014_M4_2007_fiberLLU	M3a_2014_M4_2007_VULA	M3a_2014_M4_2007_DF	M3a_2014_M4_2007_DA
ERT/FDC/HCA	0	0	0	1	1	0	0
ERT/LRIC-LRAIC (BU)/CCA	0	0	0	1	1	0	0
Price cap/FDC/HCA	1	0	1	1	1	0	1
Price cap/FDC/CCA	3	2	2	0	0	0	0
Price cap/LRIC-LRAIC (TD)/CCA	1	0	1	1	0	0	0
Price cap/LRIC-LRAIC (BU)/CCA	5	5	3	2	1	1	3
Cost orientation Alone/FDC/HCA	3	2	2	1	1	2	5
Cost orientation Alone/FDC/CCA	3	3	2	2	1	1	6
Cost orientation Alone/LRIC-LRAIC (TD)/CCA	3	3	2	2	1	3	2
Cost orientation Alone/LRIC-LRAIC (BU)/CCA	6	3	3	1	2	3	2

Source: BEREC 2017

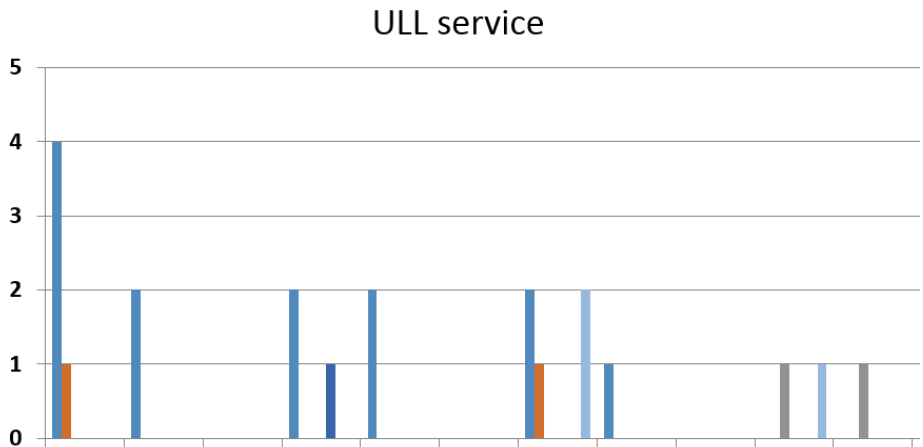
With reference to the asset base in use in these products, a top down/accounting approach is still preferred to a bottom-up model. This preference is most common when cost orientation alone is used as price control methodology.

In general, NRAs have declared homogeneous costing methodologies for products in each market. This does not necessarily hold with respect to costing methodologies applied for duct access, where some NRAs shift the costing methodology from a bottom-up cost base to a top down/accounting approach.

	Market 3a ULL 2014		Market 3a SLU 2014		Market 3a SA 2014		Market 3a fiber LLU 2014		Market 3a VULA 2014		Market 3a DF 2014		Market 3a DA 2014	
	BU	TD/ accounting methods	BU	TD/ accounting methods	BU	TD/ accounting methods	BU	TD/ accounting methods	BU	TD/ accounting methods	BU	TD/ accounting methods	BU	TD/ accounting methods
Cost orientation alone	6	9	3	8	3	6	1	5	2	3	3	6	2	13
Price cap	5	5	5	2	3	4	2	2	1	1	1	0	3	1
ERT	0	0	0	0	0	0	1	1	1	1	0	0	0	0

In figure 14 and 15 the main reasons for using the chosen costing methodology in use are reported, in relation to the relevant products in market 3a such as ULL and duct access (only combinations with at least one record are shown).

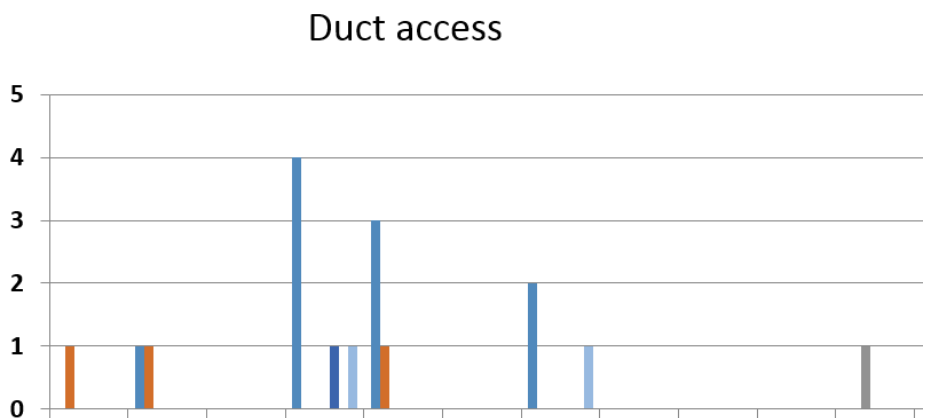
Figure 14 – Combination price control / costing methodologies - motivations (M3a)



	Cost orientation Alone/LRIC-LRAIC (BU)/CCA	Cost orientation Alone/LRIC-LRAIC (TD)/CCA	Cost orientation Alone/Pure LRIC/CCA	Cost orientation Alone/FDC/CCA	Cost orientation Alone/FDC/HCA		Price cap/LRIC-LRAIC (BU)/CCA	Price cap/LRIC-LRAIC (TD)/CCA	Price cap /Pure LRIC/CCA	Price cap/FDC/CCA	Price cap/FDC/HCA
Promote strict cost orientation	4	2	0	2	2		2	1	0	0	0
Promote infrastructure replicability	1	0	0	0	0		1	0	0	0	0
Avoid unit cost increase	0	0	0	0	0		0	0	0	1	1
Provide visibility	0	0	0	0	0		0	0	0	0	0
Avoid margin sqeeze	0	0	0	1	0		0	0	0	0	0
Being in line with EU Average	0	0	0	0	0		0	0	0	0	0
Others (please comment)	0	0	0	0	0		2	0	0	1	0

Source: BEREC 2017

Figure 15 - Combination price control / costing methods: motivations (M3a)



	Cost orientation Alone/LRIC-LRAIC (BU)/CCA	Cost orientation Alone/LRIC-LRAIC (TD)/CCA	Cost orientation Alone/Pure LRIC/CCA	Cost orientation Alone/FDC/CCA	Cost orientation Alone/FDC/HCA		Price cap/LRIC-LRAIC (BU)/CCA	Price cap/LRIC-LRAIC (TD)/CCA	Price cap /Pure LRIC/CCA	Price cap/FDC/CCA	Price cap/FDC/HCA
Promote strict cost orientation	0	1	0	4	3		2	0	0	0	0
Promote infrastructure replicability	1	1	0	0	1		0	0	0	0	0
Avoid unit cost increase	0	0	0	0	0		0	0	0	0	1
Provide visibility	0	0	0	0	0		0	0	0	0	0
Avoid margin sqeeze	0	0	0	1	0		0	0	0	0	0
Being in line with EU Average	0	0	0	0	0		0	0	0	0	0
Others (please comment)	0	0	0	1	0		1	0	0	0	0

Source: BEREC 2017

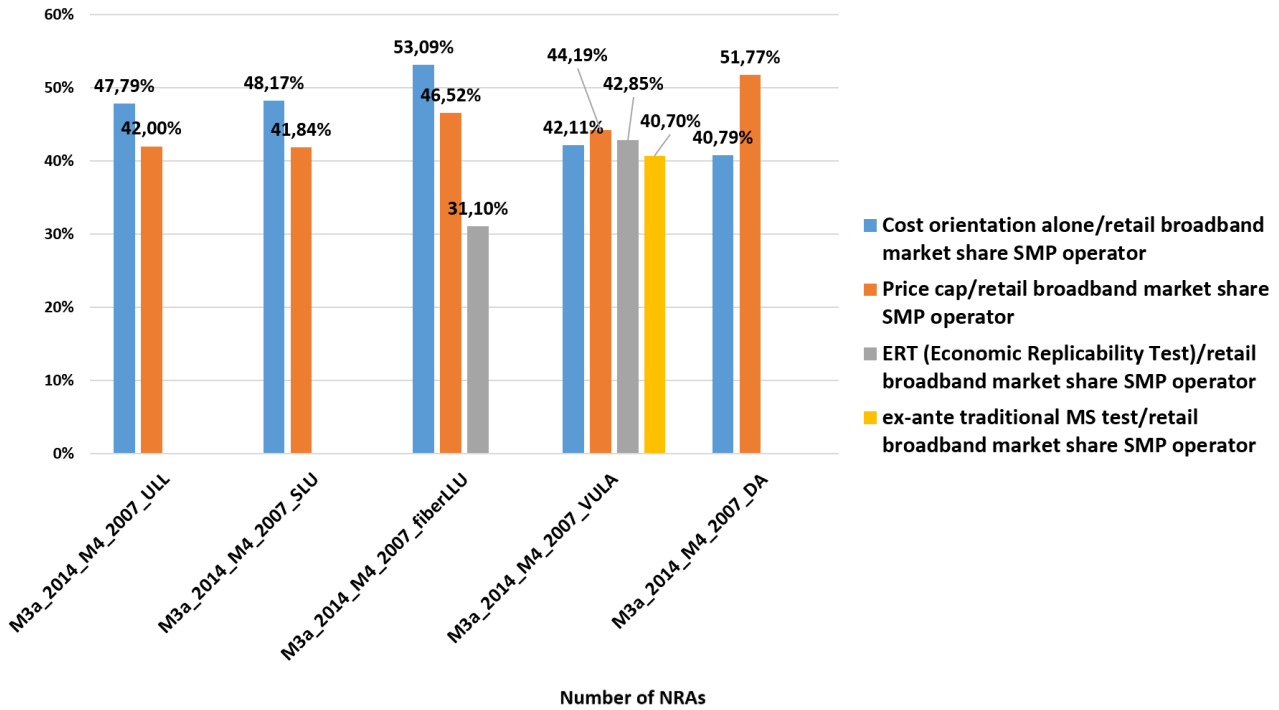
With respect to ULL, the main regulatory objectives chosen by NRAs - to promote strict cost orientation and infrastructure replicability - are achieved by considering different price control and costing methodologies. The two NRAs with the goal to enhance "infrastructure replicability apply a BU-LRIC+ approach, but with different price control methods (cost orientation alone in one case and price cap in the other case).

In case of duct access, cost orientation alone is chosen by a vast majority of NRAs. The 3 NRAs that indicate "promote infrastructure replicability" as a motivation have all chosen "cost orientation alone", but no conclusion can reasonably be drawn from this. In aggregate, TD methodologies are significantly more used than BU methodologies for duct access cost orientation.

In relation to the combination of price control and costing methodologies according to structural competitive conditions, it may be interesting to analyse if the competitive situation in a market is correlated to the choice of price control approach and costing methodologies.

Figure 16 shows, for main products in Market 3a, the relation between price control methodology and the arithmetic average of the SMP operator's broadband market share (derived from the SMP market share of fixed broadband subscriptions, provided by NRAs in the Structural Data Questionnaire). The arithmetic average has been computed for those NRAs respectively that have adopted the same price control methodology in five relevant products categories within market 3a.

Figure 16 – Arithmetic average of SMP's market shares in broadband subscriptions (M3a)



	M3a_2014_M4_2007_ULL	M3a_2014_M4_2007_SLU	M3a_2014_M4_2007_fiberLLU	M3a_2014_M4_2007_VULA	M3a_2014_M4_2007_DA
Cost orientation alone/retail broadband market share SMP operator	18	15	7	6	20
Price cap/retail broadband market share SMP operator	12	8	4	2	4
ERT (Economic Replicability Test)/retail broadband market share SMP operator	0	0	2	5	0
ex-ante traditional MS test/retail broadband market share SMP operator	0	0	0	1	0

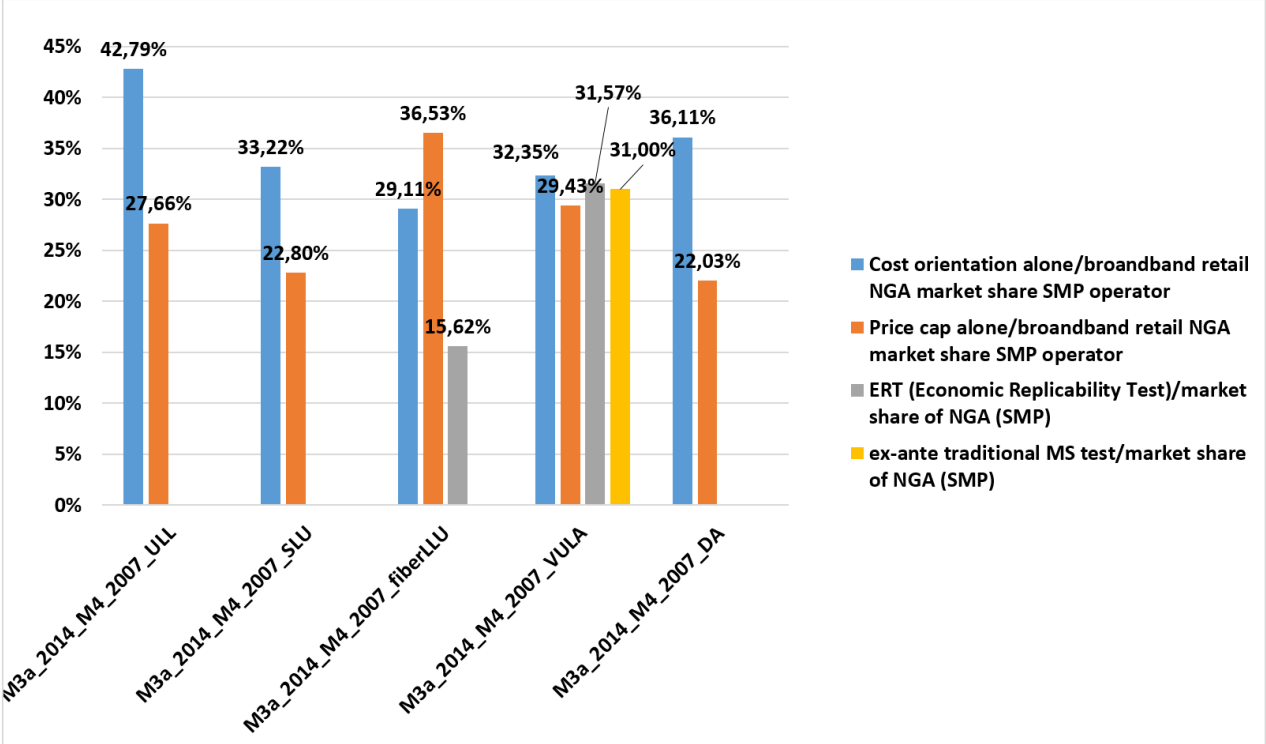
Source: BEREC 2017

The price control methodology chosen for ULL, SLU, FULL, seems related to the competitive situation in the broadband market. Data show more price flexibility of the SMP operator in case of stronger competition.

This cannot be observed in case of access to ducts where cost orientation is the most used approach seemingly independent of the competitive environment.

Figure 17 shows the same relation for NGA products (derived from the SMP market share of NGA broadband subscriptions [used as a proxy for the retail market share], provided by NRAs in the Structural Data Questionnaire).

Figure 17 - Arithmetic average of SMP's market shares in NGA broadband subscriptions (M3a)



Number of NRAs

	M3a_2014_M4_2007_ULL	M3a_2014_M4_2007_SLU	M3a_2014_M4_2007_fiberLLU	M3a_2014_M4_2007_VULA	M3a_2014_M4_2007_DA
Cost orientation alone/SMP operator's share in NGA broadband subscriptions	14	11	5	5	11
Price cap alone/SMP operator's share in NGA broadband subscriptions	11	7	4	2	3
ex-ante traditional MS test/SMP operator's share in NGA broadband subscriptions			0	1	
ERT (Economic Replicability Test)/SMP operator's share in NGA broadband subscriptions			2	5	

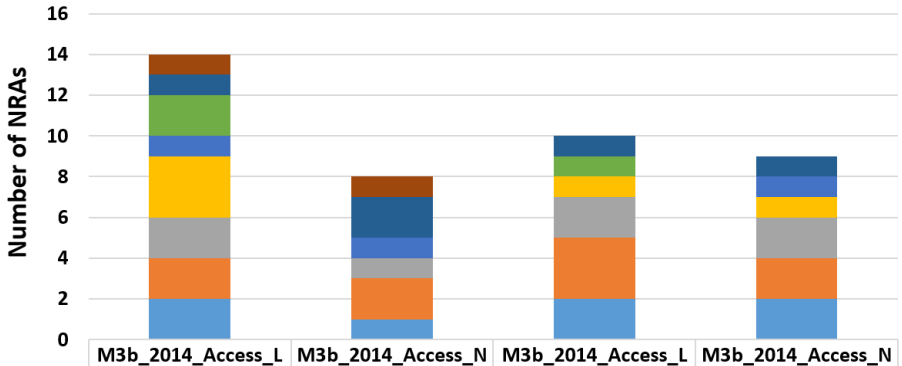
Source: BEREC 2017

In this case the hierarchy between cost orientation, price cap and ERT is less evident at least when an access obligation is imposed explicitly to improve competition within NGA. Data show that price cap for ULL and SLU is preferred over cost orientation where a lower SMP operator's share in NGA broadband subscriptions is found.

3.5.2 Market 3b

In Figure 18 the combination between costing methodologies and price control approach is presented for products in market 3b. As for market 3a no clear preference of costing methodologies applied with respect to a price control in use can be detected.

Figure 18 - Combination price control / costing methods (M3b)



	M3b_2014_Access_Legacy	M3b_2014_Access_NGA	M3b_2014_Access_Legacy_backhaul	M3b_2014_Access_NGA_backhaul
ERT/LRIC-LRAIC (BU)/CCA	1	1	0	0
Price cap/FDC/HCA	1	2	1	1
Price cap/FDC/CCA	2	0	1	0
Price cap/LRIC-LRAIC (BU)/CCA	1	1	0	1
Cost orientation Alone/FDC/HCA	3	0	1	1
Cost orientation Alone/FDC/CCA	2	1	2	2
Cost orientation Alone/LRIC-LRAIC (TD)/CCA	2	2	3	2
Cost orientation Alone/LRIC-LRAIC (BU)/CCA	2	1	2	2

Source: BEREC 2017

With respect to the cost base there is a clear preference to use an accounting asset base instead of a bottom-up approach. In case ERT is in force as the price control method used, a bottom-up asset base is in use, which is consistent with the provision of Annex 2 of the Commission recommendation on costing methodology.

	Market 3b access legacy 2014		Market 3b access NGA 2014		Market 3b backhaul legacy 2014		Market 3b backhaul NGA 2014	
	BU	TD/ accounting methods	BU	TD/ accounting methods	BU	TD/ accounting methods	BU	TD/ accounting methods
Cost orientation alone	2	7	1	3	2	6	2	5
Price cap	1	3	1	2	0	2	1	1
ERT	1	0	1	0	0	0	0	0

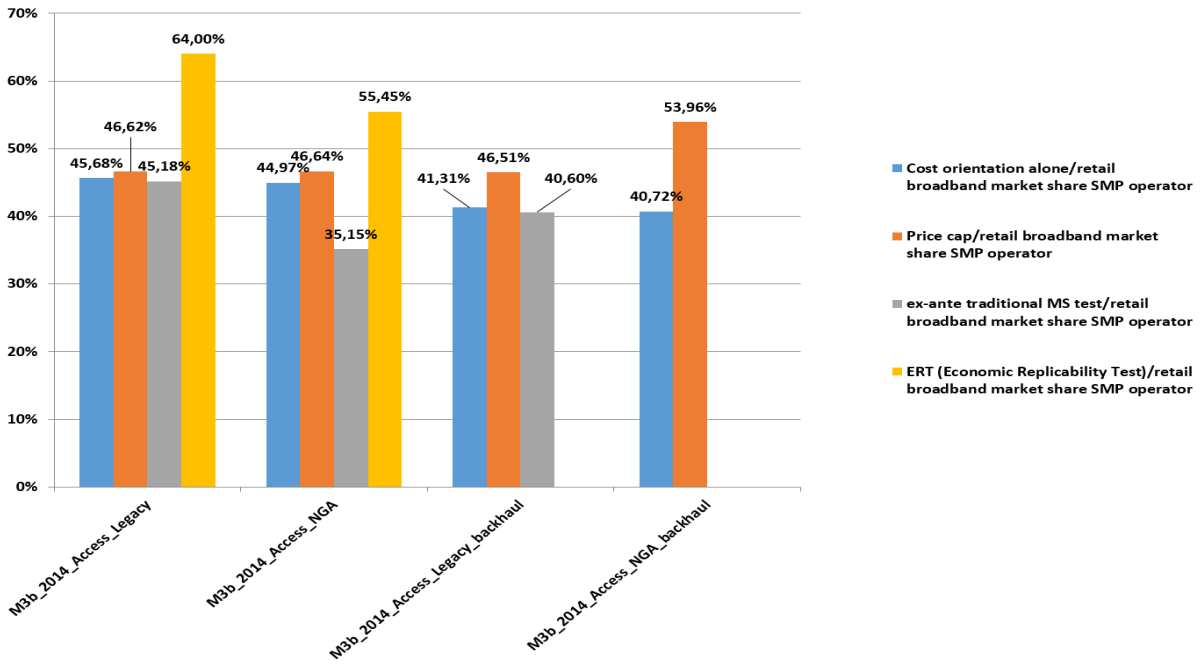
The main motivation behind the costing methodology for this section of the questionnaire cannot be analyzed because of the low number of replies provided.

For market 3b, it may also be interesting to analyse whether the competitive situation may have an influence on the choice of price control approach and costing methodologies adopted.

Figure 19 shows the arithmetic average of SMP operator's broadband market share (in number of subscribers provided by NRAs in the Structural Data Questionnaire) evaluated considering only

those NRAs that have adopted the same price control methodology combination in relevant products of market 3b.

Figure 19 – Arithmetic average of SMP's market share in broadband subscriptions (M3b)

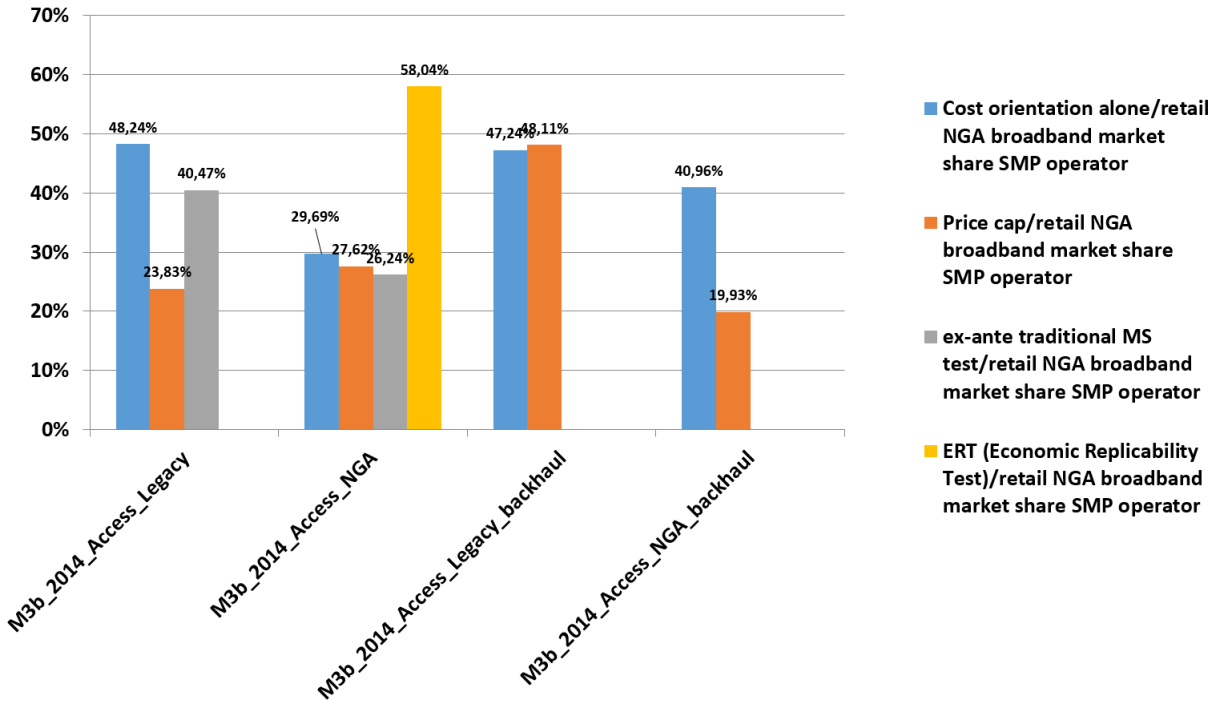


Number of NRAs

	M3b_2014_Access_Legacy	M3b_2014_Access_NGA	M3b_2014_Access_Legacy_backhaul	M3b_2014_Access_NGA_backhaul
Cost orientation alone/retail broadband market share SMP operator	10	5	9	7
Price cap/retail broadband market share SMP operator	5	3	2	2
ex-ante traditional MS test/retail broadband market share SMP operator	3	1	1	0
ERT (Economic Replicability Test)/retail broadband market share SMP operator	1	3	0	0

Source: BEREC 2017

Figure 20 - Arithmetic average of SMP's market share in NGA broadband subscriptions (M3b)



Number of NRAs

	M3b_2014_Access_Legacy	M3b_2014_Access_NGA	M3b_2014_Access_Legacy_backhaul	M3b_2014_Access_NGA_backhaul
Cost orientation alone/SMP operator's share in NGA broadband subscriptions	9	4	8	6
Price cap alone/SMP operator's share in NGA broadband subscriptions	5	3	2	2
ex-ante traditional MS test/SMP operator's share in NGA broadband subscriptions	2	1	0	0
ERT (Economic Replicability Test)/SMP operator's share in NGA broadband subscriptions	0	2	0	0

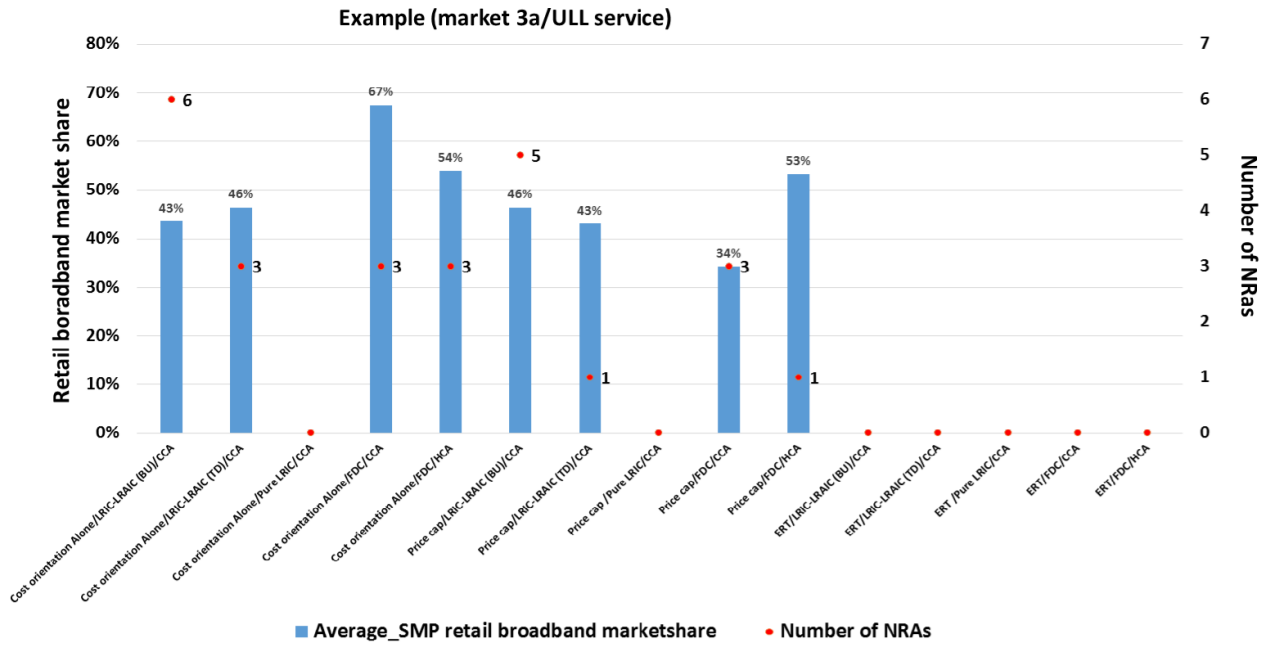
Source: BEREC 2017

For market 3b, no strong relationship can be observed between the types of price control and the retail market share of the SMP operator.

Figure 21 shows for ULL service the relation between price control and costing methodologies with respect to competitive conditions, measured as SMP market share in retail broadband market. From the collected evidence it is possible to summarize a prevalent use of accounting method such as FDC/CCA/HCA in combination with cost orientation alone in case of highest market share of the

incumbent. Cost orientation alone/price cap applied with BU-TD LRIC+ is frequent in case competition in the broadband market is at an intermediate stage, while ERT is found, in combination with BU-LRIC+, only for FLLU, in case of higher level of competition in broadband market (see figure 16).[13]

Figure 21 - Combinations price control / costing methodologies: M3a (ULL)



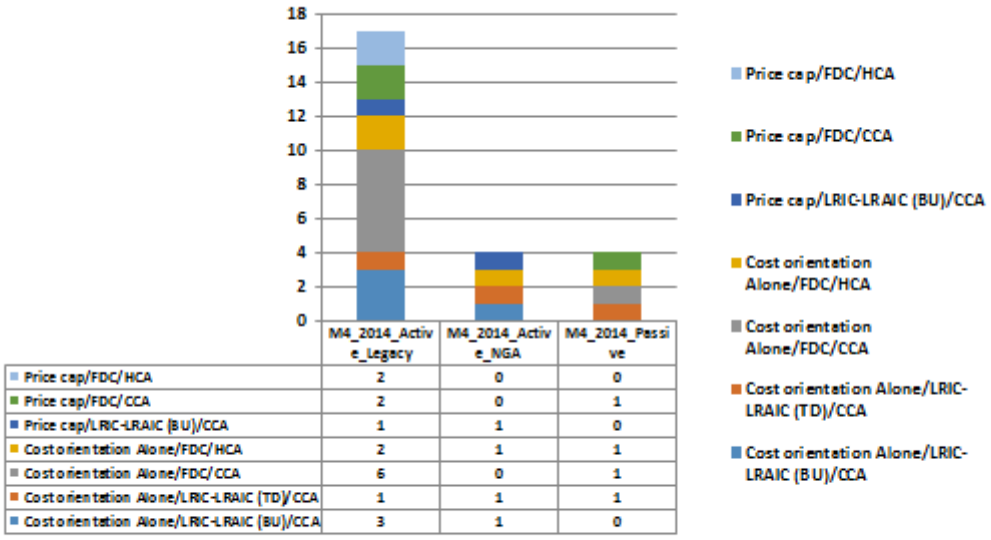
Source: BEREC 2017

[13] Cf. also BoR (11) 65.

3.5.3 Market 4

In Figure 22 the combination between costing methodologies and price control approach is -presented for products in market 4.

Figure 22 – Combination price control / costing methodologies (M4)



	M4_2014_Active_Legacy	M4_2014_Active_NGA	M4_2014_Passive
Price cap/FDC/HCA	2	0	0
Price cap/FDC/CCA	2	0	1
Price cap/LRIC-LRAIC (BU)/CCA	1	1	0
Cost orientation Alone/FDC/HCA	2	1	1
Cost orientation Alone/FDC/CCA	6	0	1
Cost orientation Alone/LRIC-LRAIC (TD)/CCA	1	1	1
Cost orientation Alone/LRIC-LRAIC (BU)/CCA	3	1	0

Source: BEREC 2017

For active legacy products a preference for Cost Orientation Alone combined with an FDC/CCA approach seems to be predominant. With reference to the asset base in use in the market in general a top down/accounting approach is preferred; the implementation of a BU model is independent from the price control method in use.

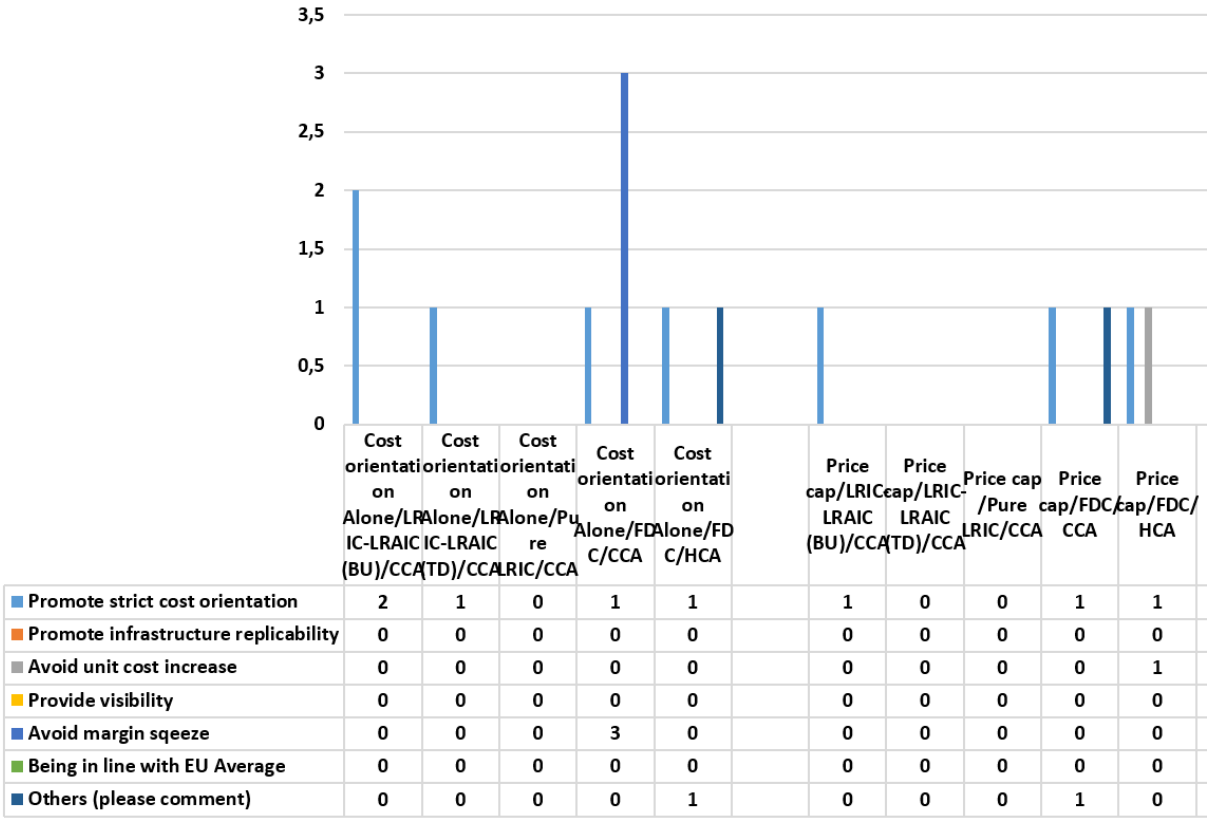
A modeling approach is more frequently used for active NGA products (both on a BU or top down asset base, moreover only one NRA applies a strict accounting method approach).

In case of passive products all NRAs that have provided information use the asset base of the SMP operator and an allocation method based on FDC.

	Market 4 Active legacy 2014		Market 4 Active NGA 2014		Market 4Passive NGA 2014	
	BU	TD/ accounting methods	BU	TD/ accounting methods	BU	TD/ accounting methods
Cost orientation alone	3	9	1	2	0	3
Price cap	1	4	1	0	0	1

Taking into account the main motivation declared by NRAs the following can be shown:

Figure 23 – Combination price control / costing methodologies: motivations (M4)



Source: BEREC

Other than “promote strict cost orientation” a main priority is to “avoid margin squeeze”.

3.6 Implementation of the Non-discrimination and Costing Methodologies Recommendation

This section gives an overview of the implementation of the “Recommendation on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment (2013/466/EU)” of 11 September 2013, with regard to costing

methodologies. To this end, data collection included, as in the previous release of 2016 report, some parts on this topic.

2017 report provides a deep analysis, in continuity with last year version, about the implementation of the Recommendation, considering that almost three years have passed since the adoption and considering the fact that the 31 December of 2016 was the deadline for the implementation.

Specifically NRAs were asked how they intend to implement the framework of the Recommendation for non-discrimination obligations and costing methodologies in Market 3a, first of all asking specifically to choose between the following options: i) Recommends 30-37 (CCA-BU LRIC+); ii) Recommend 40; iii) Recommend 42.

Table 8 - EC Recommends

EC Recommends	Content
Recommends 30-37	When "cost orientation" is imposed to legacy and NGA access services the costing methodology should follow a forward looking CCA BU-LRIC+ approach.
Recommend 40	NRAs may continue to apply beyond 31 December 2016 the costing methodology that they use at the time of entry into force of the Recommendation, if it meets the general objectives of consistency, predictability and price stability over time during the migration from legacy network to NGA network (recital 25-28) and *inter alia:* • i) it should reflect a gradual shift from copper network to an NGA network; • ii) it should apply an asset valuation method that takes into account that certain civil infrastructure assets would not be replicated in the competitive process; • iii) it should guarantee that copper network prices do not fluctuate significantly and therefore will remain stable over a long time period; • iv) it should require only minimal modifications with respect to the costing methodology already in place.
Recommend 42	In those Member States where at the time of entry into force of this Recommendation, the monthly rental price for the full unbundled copper local loop fell within the price band, NRAs may continue to apply until 31 December 2016 the costing methodology that they use at the time of entry into force of the Recommendation

This year, fourteen NRAs provided explicit information with respect to the proposed questions declaring to be in line with one of three options previously described. The result is shown in the table below.

Table 9 - NRA implementation of EC Recommends

	2016	2017
Recommend 30-37 (CCA BU-LRIC+)	7	9
Recommend 40	6	5
Recommend 42	0	0
Total	13	14

It needs to be pointed out that one NRA that last year declared to be in line with Recommend 40 this year moved to Recommend 30-37 due to the update of the market analysis in 2016. One NRA declared to have implemented a BU-LRIC+ model during 2017 in line with recommend 30-37 although it was still under consultation.

Consistent with Recommends 30-37 and 40 of the Commission Recommendation, few relevant questions have been addressed on the asset life or the percentage of civil infrastructure considered to be a reusable asset.

Replies by NRAs to this part of the questionnaire are summarized in the following table.[14]

Table 10 - NRAs information on Recommends 37 and 40

	Number of Nras	Did you consider the DEA Target in your model? (Yes)	Take into account reusable civil infrastructure ? (Yes)	-if yes which method did you use to consider already depreciated infrastructure?		Do you consider cable as riusable infrastructure ? (Yes)	Is a gradual shift from copper network to NGA network taken into account? (Yes)
				Accounting data from SMP operator	Benchmark		
Reccomenda 37	9	2	8	6	1	3	6
Recommend 40	5	-	2	2	0	0	1

From this analysis, we understand that DEA targets are explicitly implemented in the BU-LRIC model by two NRAs. The two NRAs that declared to take into account the DEA target in the model explain in one case that the SMP operator's plans are in line with this provision, in the other case by wanting to foster effective competition and investment in line with the NGA Recommendation.

The majority of NRAs that implement Recommends 30-37 have taken into account reusable civil infrastructures in the modelling process, whereby cables are considered to be reusable infrastructure only by 3 NRAs. Furthermore, the analysis shows that the level of the depreciated infrastructure is derived mainly from the accounting data of the SMP operator.

The following table summarises the replies provided about the level of asset life of civil infrastructures, the percentage of civil infrastructures considered reusable and the percentage of asset life already depreciated.[15]

Table 11 - NRA information on civil infrastructure

	Recommend 30-37 (CCA-BU LRIC+) (minimum-maximum)	Recommend 40 (minimum-maximum)
Civil infrastructure asset life (number of year) (minimum - maximum)	30-40	30-46
Percentage of civil infrastructures considered reusable (minimum - maximum)	35%-95% (sample of 5 NRAs, 63% average)	85%-100% (2 NRAs)
Percentage of asset life already depreciated of reusable civil infrastructures (minimum - maximum)	20%-33%	-

[14] Only affirmative replies have been included in the table.
[15] In the table only maximum and minimum are given as only few NRAs have provided information.

The questionnaire also included a question on the outcome of the application of the Recommendation in terms of prices for the fully unbundled copper local loop.

In Recommend 41 the Commission Recommendation indicates that the outcome of the methodology proposed should ensure that the average monthly rental access price for the fully unbundled copper local loop should be within a band between EUR 8 and EUR 10 (net of all taxes) expressed in 2012 prices (the price band). To this end the questions about prices were on the level of LLU charges: i) “before the adoption of the recommendation”; ii) “after the adoption of the recommendation”; iii) “actual prices”.

Including only countries that have provided data for this section we can summarize the above three scenarios. In relation to the price “before the adoption of the Recommendation” we can leave the price band at the price of 2012 not including inflation. In relation to the “actual price” as well as for the price after “the adoption of the Recommendation” the price band can be updated taking into account information on inflation rate available on Eurostat database.[16] In this case the price band[17] has been updated taking into account the cumulated inflation from 2013 until 2016 as reported in the following table (in Euro currency) (Table 12). The impact of inflation is, in most cases, marginal.

[16] http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tec00118&plugin=1 where not available the EU 28 Country average has been used.
[17] “Lower /Upper level” refers to the price band lower and upper bounds (8 and 10 Euro) reported in the Recommendation adjusted by inflation.

Table 12 – LLU Charges from "price band"

	Lower Level	High Level
AT	€ 8.44	€ 10.55
BE	€ 8.15	€ 10.19
BG	€ 7.71	€ 9.64
CH	€ 7.90	€ 9.88
CY	€ 7.79	€ 9.74
CZ	€ 8.22	€ 10.27
DE	€ 8.23	€ 10.29
DK	€ 8.09	€ 10.11
EE	€ 8.37	€ 10.47
EL	€ 7.73	€ 9.66
ES	€ 8.03	€ 10.04
FI	€ 8.29	€ 10.36
FR	€ 8.16	€ 10.20
HR	€ 8.13	€ 10.16
HU	€ 8.18	€ 10.22
IE	€ 8.05	€ 10.06
IT	€ 8.11	€ 10.14
LI	€ 8.19	€ 10.23
LT	€ 8.11	€ 10.14
LU	€ 8.20	€ 10.25
LV	€ 8.08	€ 10.10
MK	€ 8.19	€ 10.23
MT	€ 8.32	€ 10.40
NL	€ 8.26	€ 10.32
NO	€ 7.90	€ 9.88
PL	€ 8.00	€ 10.00
PT	€ 8.10	€ 10.13
RO	€ 8.25	€ 10.31
RS	€ 9.06	€ 11.33
SE	€ 8.19	€ 10.24
SI	€ 8.10	€ 10.13
SK	€ 8.05	€ 10.06
UK	€ 8.39	€ 10.49

From gathered data, it seems that after the adoption of the Recommendation, no LLU charges higher than the price band have been imposed, conversely to the case "before the adoption of the Recommendation". Moreover, it is relevant to say that NRAs that apply the methodologies included in the Recommendation generally don't consider the price band as a purpose in itself.

Due to the limited number of countries that have provided data, no clear conclusions can be drawn regarding this topic. However, bearing this in mind some preliminary elements can be summarized as follows: i) a slight tendency towards homogeneity in prices for countries which follow Recommends 30-37; ii) as for Recommend 40, NRAs apply the methodology in line with the general objectives of consistency, predictability and price stability over time.

3.7 Implementation of the Termination Rates Recommendation[18]

This paragraph provides an overview of the level of implementation of the Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU (2009/396/EC),[19] using also data contained in the BEREC Report "Fixed and mobile termination rates in EU – January 2016", prepared by the BEREC Benchmarking EWG in cooperation with the BEREC Termination Rates EWG and the BEREC Office.[20]

Data from the previous BEREC Report shows that, for the fixed termination market, 32 countries out of 37 providing data declared that symmetry in rates has already been reached. In two cases there is no symmetry in fixed termination rates, while 2 NRAs declared that symmetry is partially applied. As far as the model used by NRAs is concerned, 22 countries out of 36 with a valid answer have declared that a pure BU-LRIC model has been implemented; 5 out of 36 countries use benchmarking.

One of the effects of the implementation of the TR Recommendation is that from 2012 to 2017 the simple EU average of TRs for the incumbent's fixed network at the three fixed interconnection layers decreased on average by 61 per cent taking into account for 2012 the layer 1 interconnection level (from a 0.54 average per minute in 2012 to 0.21 on average in 2017, see doc. BoR(17)101).

For the mobile termination market, the analysis shows that in almost all the countries (34 out of 37 providing data) symmetry has already been reached.

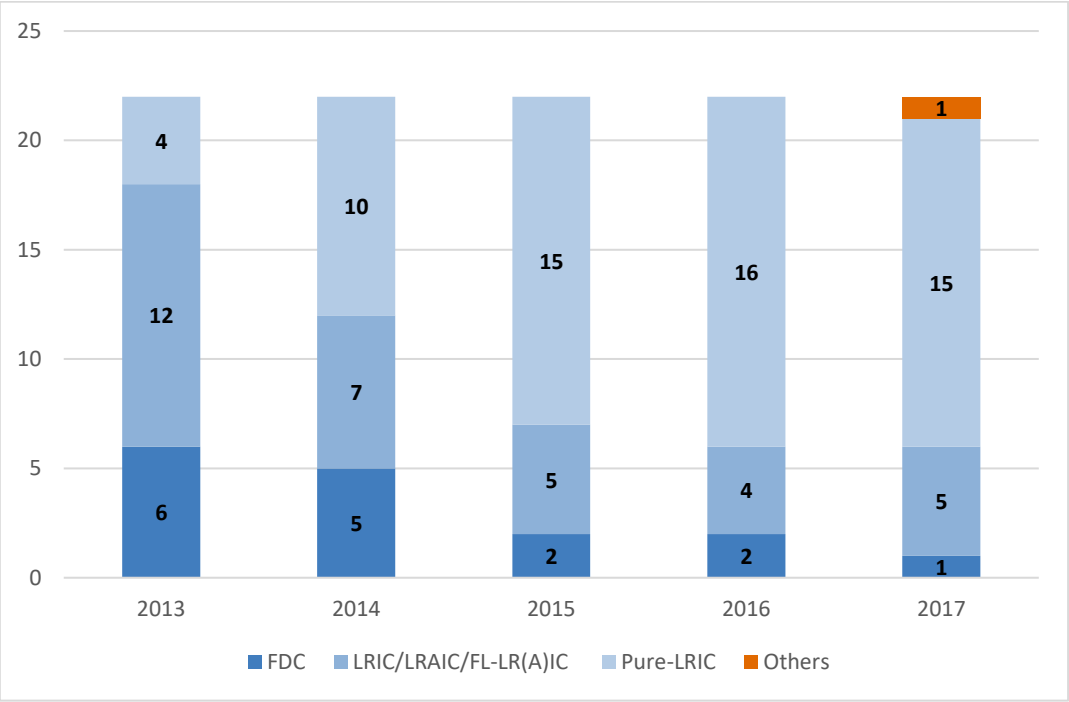
As far as the model used by the NRAs is concerned, it can be observed that 23 countries out of 37 have declared that a pure BU-LRIC model has been implemented, while 6 countries declared to use benchmarking in line with BU-LRIC model.

From 1st January 2012 to 1st January 2017 the simple EU average of MTRs decreased by 76 per cent (from 4.03 €-cent/min in 2012 (doc. BoR(12)56) to 0.95 €-cent/min (doc. BoR(17)101)). For mobile termination too this result can be considered as the main effect of the implementation of the TR Recommendation.

In light of the Commission Recommendation on Termination Rates (2009/396/EC) which had to be applied as of 2013 a more specific view about the cost allocation methodology applied since 2013 is given in Figures 34 and 35. Indeed 22 and 24 NRAs provided information about the cost accounting methodology applied in the last four years of the RA EWG data collection in Market 1 and 2. The graphs confirm a growing adoption of a pure LRIC approach in both markets as recommended.

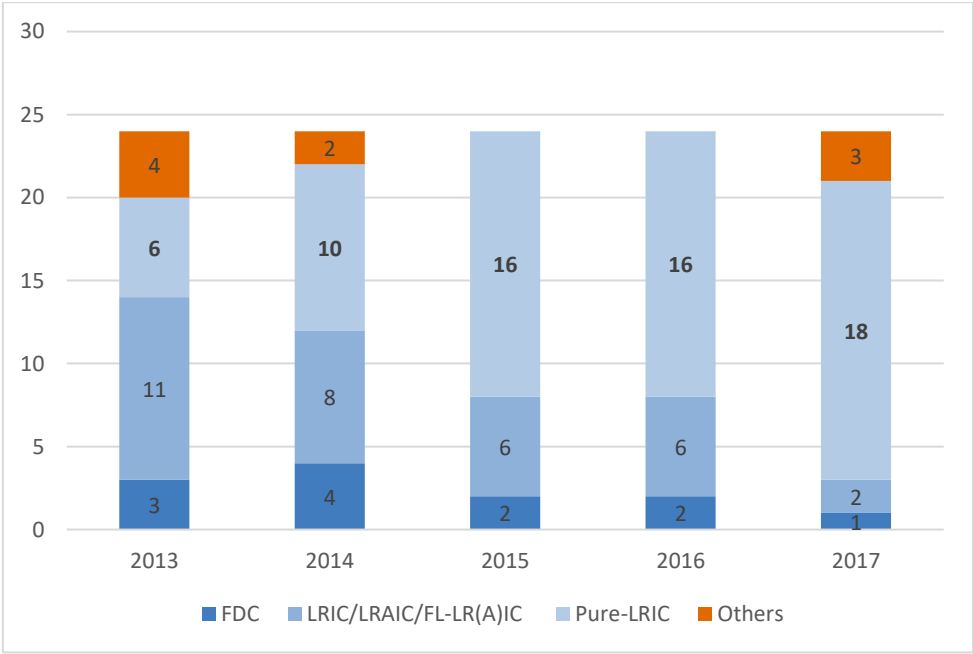
[18] Termination Rates Recommendation of 7th May 2009.
[19] The Termination Rates Recommendation is under review.
[20] Request for information sent to all NRAs refers, in general, to data as of 1st January 2017. Thirty-six (36) NRAs provided data.

Figure 24 - Accounting method for fixed call termination (M1)



Source: BEREC
Number of countries: 22

Figure 25 - Accounting method for mobile call termination (M2)



Source: BEREC
Number of countries: 24

4. Additional Information: structural data

This section serves to identify main structural differences within European countries, for example the competitive and market situation in each country, population and population density indicators as well as existing telecommunications infrastructure.

These structural differences have an influence on NRAs regulatory strategy and therefore the choice of price control method. The influence of factors such as infrastructure competition, demand and supply side factors is analysed in more detail in the BEREC Report on Challenges and drivers of NGA rollout infrastructure competition (BoR (16) 96). However, it should be pointed out that there are a number of other important factors that may influence NRAs regulation strategy (such as the national broadband strategy, special competitive challenges and country specific consumer behaviour).

A total of 33 NRAs[21] have provided data for this section. If data is confidential and can therefore not be shown in the analysis, it will be mentioned in the footnotes.

The following structural data have been collected (data as at 1st April 2017):

[21] No data from Albania (AL), Montenegro (ME), Turkey (TR), Iceland (IS).

Table 13 - Structural Data collected from NRAs

1	Market situation
1.1	fixed broadband penetration (subscription as a % of population)
1.2	fixed broadband subscriptions: % of cable modems (DOCSIS 3.0 included)
1.3	fixed broadband subscriptions: % of DSL lines (VDSL included)
1.4	fixed broadband subscriptions: % FTTH/B
1.5	mobile broadband penetration (all active users as a % of population) [22]
2	Population and surface area per country[23]
2.1	number of inhabitants
2.2	number of inhabitants biggest city
2.3	% of total population (main metropolis population density)
2.4	number of inhabitants three biggest cities
2.5	% of total population (metro population density)
2.6	country area in square km
2.7	number of inhabitants per square km
3	Subscriber lines
3.1	Total number of active physical lines
3.2	ITU fixed telephone lines[24]
3.3	ITU fixed telephone lines per 100 inhabitants[25]
4	MDF Main Distribution Frame
	total number
5	Street Cabinets
	total number
6	Local loop (MDF to customer site)
6.1	total average length in metres (total copper pair metre per active access)
6.2	average trench metre per active subscriber line (total length of cable conduit + buried cable / active physical lines)
7	Distribution cable (street cabinet to customer site)
	total average length in metres (total copper pair metre per active access)
8	Civil engineering
8.1	% of feeder cable (MDF to street cabinet): cable conduit / buried cable[26]
8.2	% of distribution cable (street cabinet to customer site): cable conduit / buried cable[27]
8.3	% feeder / distribution cable (proportion of copper pair metres) [28]
9	Duct/infrastructure sharing
9.1	% of duct sharing with other services[29]
9.2	% of duct sharing per feeder / distribution cable[30]
9.3	average cost saving (estimate)[31]
10	Market shares
10.1	Fixed broadband subscriptions – incumbent (SMP operator)
10.2	DSL broadband subscriptions – incumbent (SMP operator)
10.3	NGA (FTTx) broadband subscriptions – incumbent (SMP operator)
10.4	DSL broadband subscriptions - competitors
10.5	NGA (FTTx) broadband subscriptions – competitors
10.6	Fixed broadband subscriptions – cable operators

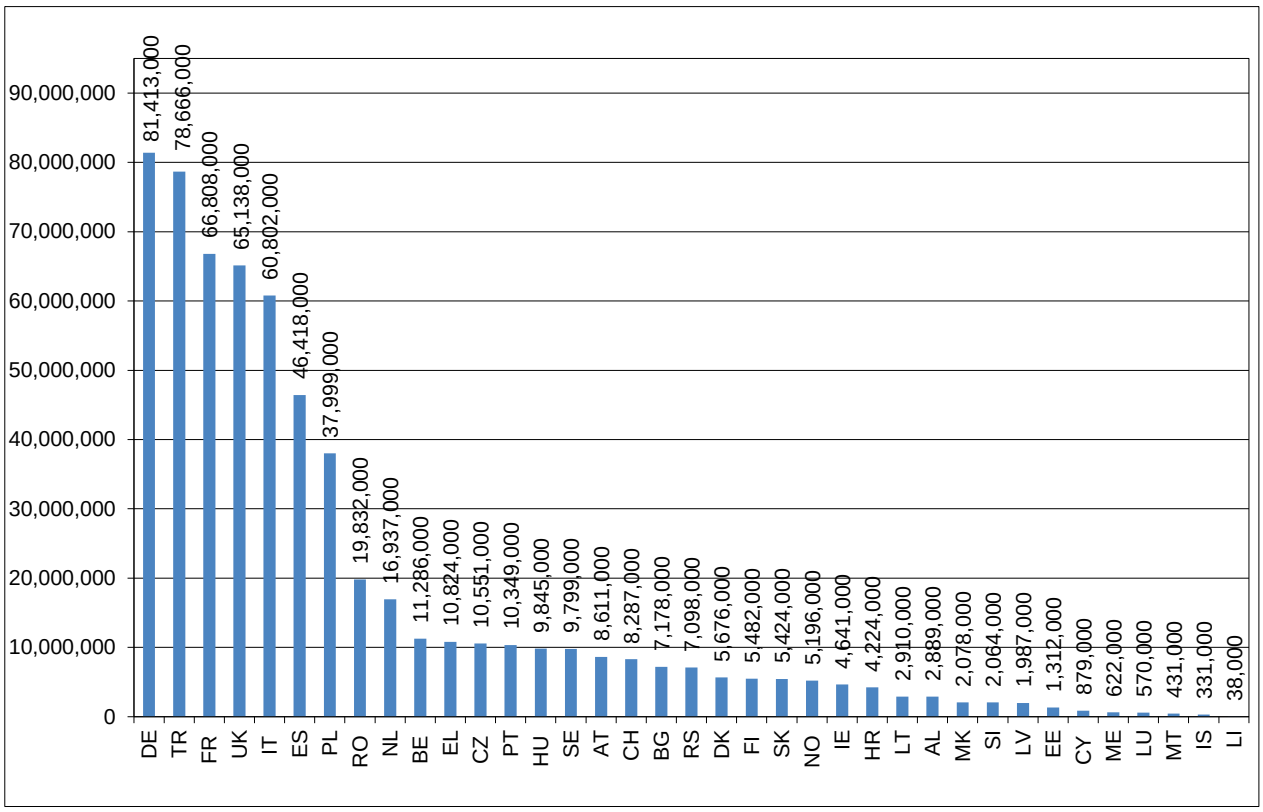
[22] Some of the data provided was inconclusive and therefore this point was omitted from the report.
[23] Data source: Fischer Weltalmanach 2017. 2.2 and 2.3 not used in the analysis.
[24] Source: International Telecommunication Union (ITU), 2015 data used for verification of NRA data only.
[25] Source: International Telecommunication Union (ITU), 2015 data used for verification of NRA data only.
[26] % of cable conduit (cable duct) vs. buried cable in the feeder segment of the network.
[27] same as **Error! Bookmark not defined.** in the distribution segment of the network.

4.1 Population and country size

This information stems from publicly available data[32], therefore all 37 countries usually providing information for the Regulatory Accounting Report[33] have been included in the analysis. This data – naturally static and largely unchanged in comparison to last year's data – can have a considerable influence on the cost of telecommunications infrastructure. A high population density in urban areas vs. few users in sparsely populated rural areas results in different investment risk for telecommunications companies.

When looking at the ***total population*** (i. e. the total number of inhabitants per country) the top 10 countries with a population of above 11 Mio. are: DE, TR, FR, UK, IT, ES, PL, RO, NL, BE.

Figure 26 - Total Population

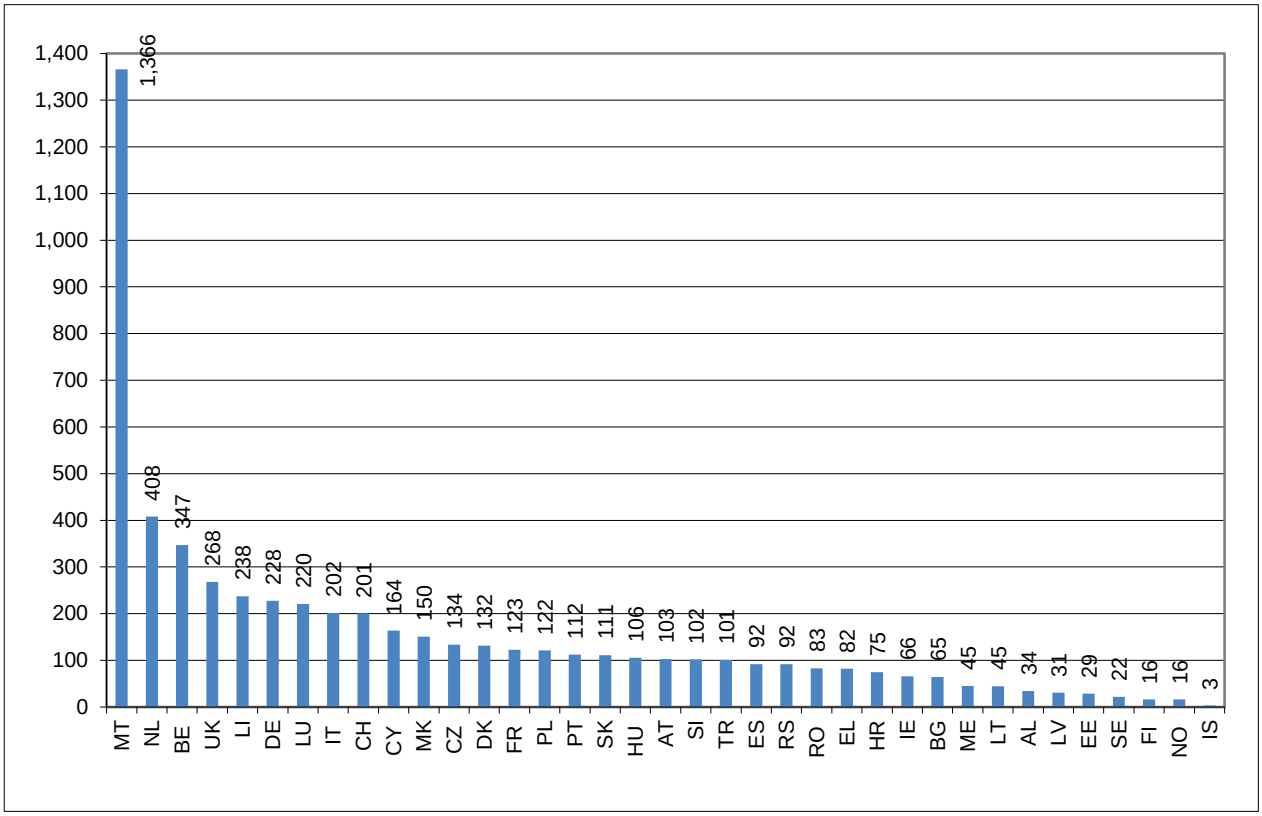


Source: Fischer Weltalmanach 2017

[28] Total length of the copper pairs in metres of the local sub-loop
[29] % contribution of "other services" (water, electricity) to civil engineering costs.
[30] Distribution of duct sharing between the feeder and distribution segments of the network.
[31] The resulting (estimated) average cost savings.
[32] Fischer Weltalmanach 2017, editorial deadline of 1st July 2016
[33] AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, EL, ES, FI, FR, HR, HU, IE, IS, IT, LI, LT, LU, LV, ME, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, UK, TR

In terms of ***population density*** (i.e. the number of inhabitants per square kilometre), the picture of the top 10 countries looks different: MT, NL, BE, UK, LI, DE, LU, IT, CH CY with 9 of these countries with more than 200 people per square km. Interestingly, 5 of these top 10 countries are amongst the countries with the largest total population (NL, BE, UK, DE, IT) 4 amongst the smallest (MT, LI, LU, CY).

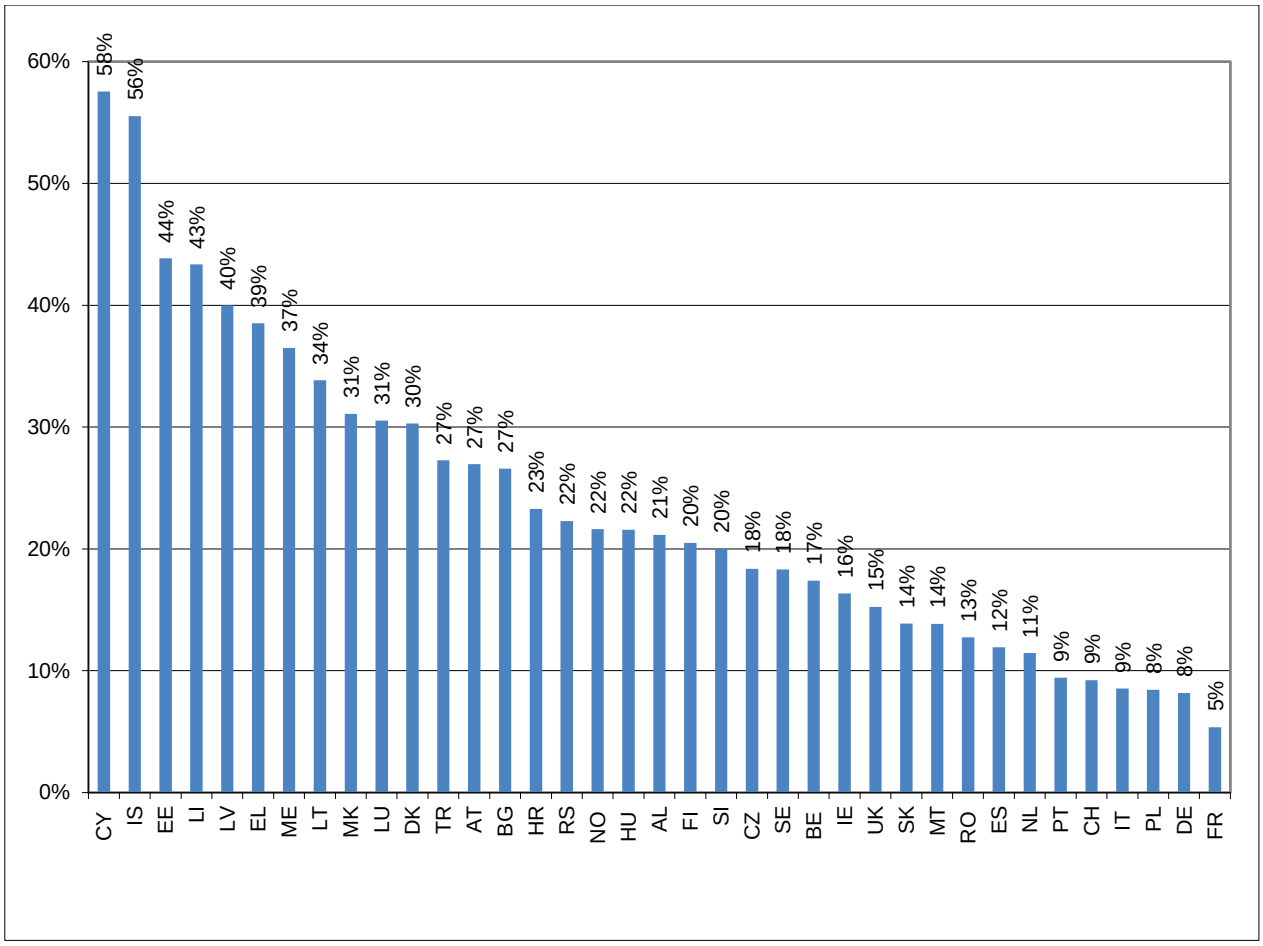
Figure 27 - Population Density



Source: Fischer Weltalmanach 2017

Looking at the ***metro population density*** (i.e. the number of inhabitants in the three biggest cities as a percentage of the total population) it is interesting to note that mostly smaller countries have a higher metro population density because a sizeable part of the total population live in the major cities. In the larger countries like Germany, France, Poland and Italy this measure is rather low due to a more spread out population. The top 10 countries in this category with a percentage of above 30 are CY, IS, EE, LI, LV, EL, ME, LT, MK, LU.

Figure 28 - Metro Population Density



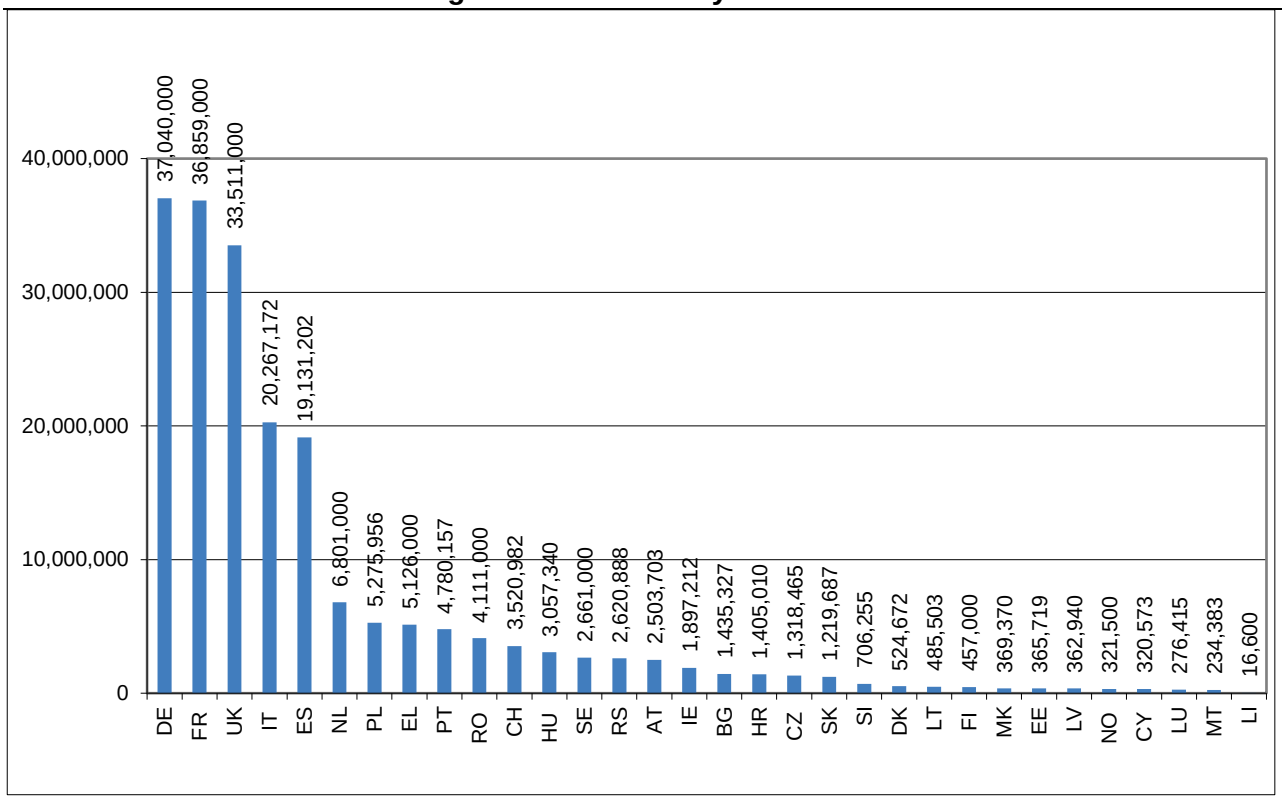
Source: Fischer Weltalmanach 2017

4.2 Market and competitive situation

The market and competitive situation within the different countries, which has a direct influence on regulatory direction, shows considerable disparity.

Voice communication via classical telephone lines is represented by the total number of ***active physical subscriber lines***.[34] The total number usually correlates with the number of households in the country and ranges from 16,600 in Liechtenstein to more than 37 million in Germany. Top 10 countries are – not surprisingly almost identical to the top 10 total population countries – DE, FR, UK, IT, ES, NL, PL, EL, PT, RO.

Figure 29 - Active Physical Lines

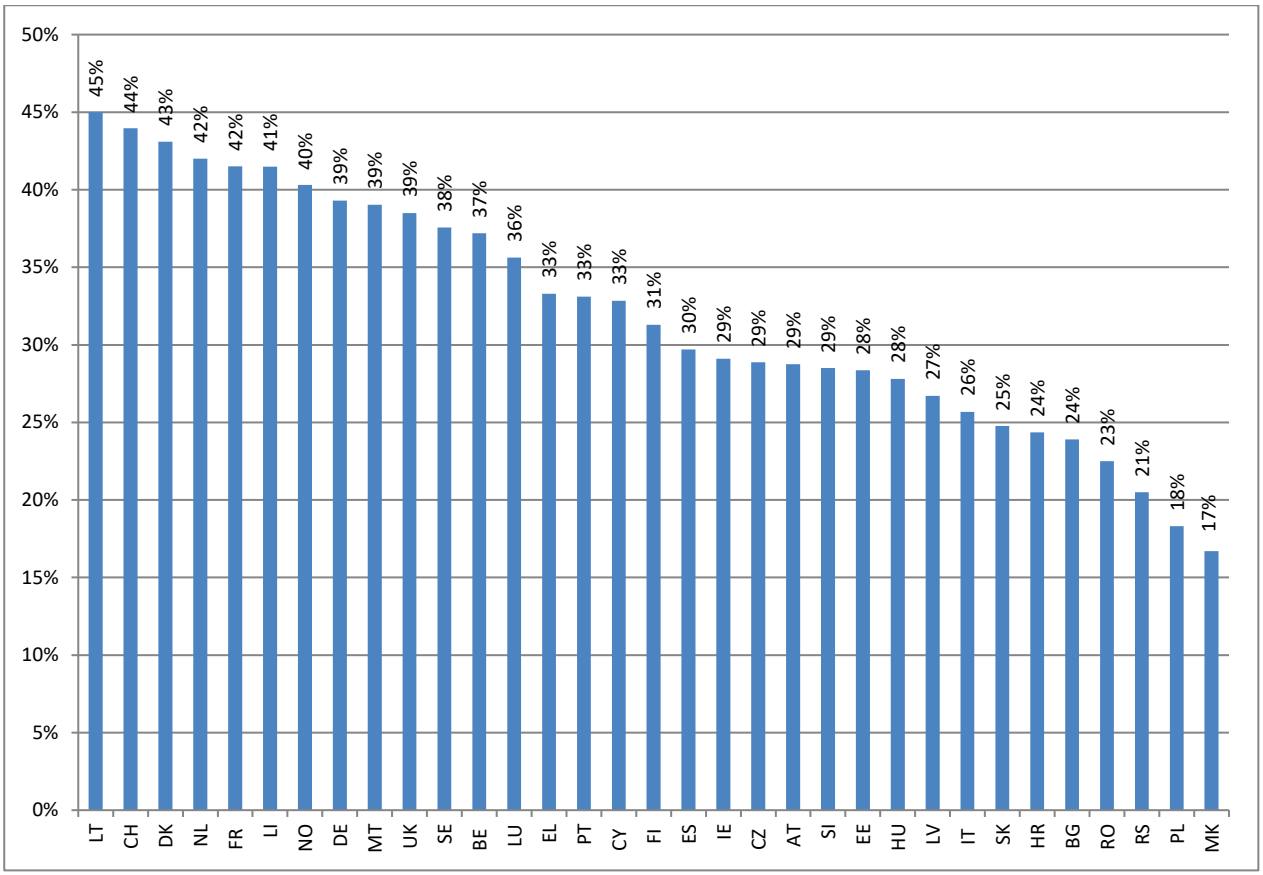


Source: BEREC 2017

[34] Data in BE are confidential. RS data without CDMA-FWA (63.531)

The ***fixed broadband penetration***, representing fixed broadband subscriptions as a percentage of the total population, varies between 17 per cent in Macedonia and 45 per cent in Lithuania. Top 10 countries in terms of fixed broadband penetration with above 38 per cent are LT, CH, DK, NL, FR, LI, NO, DE, MT, UK.

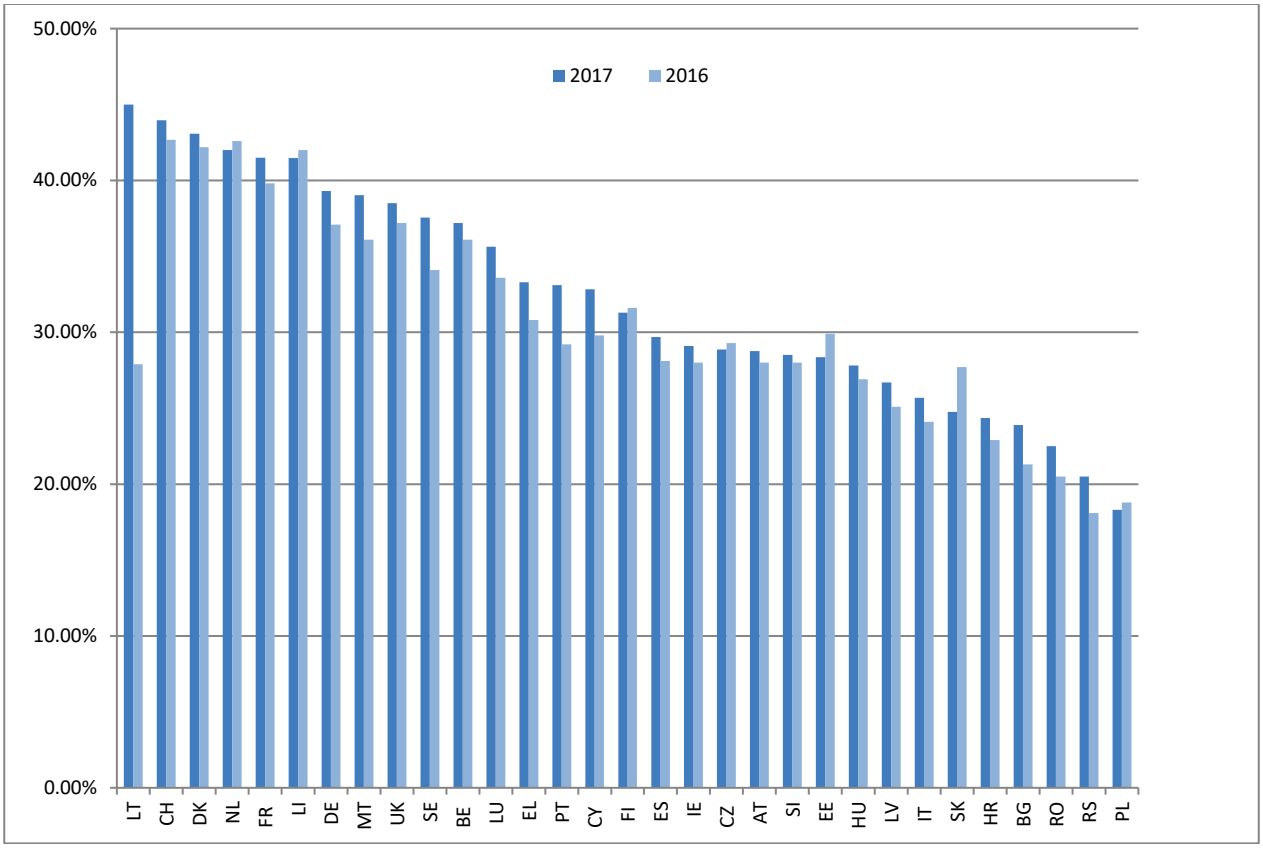
Figure 30 - Fixed broadband penetration 2017



Source: BEREC 2017

It can be observed in **Error! Reference source not found.** that the fixed broadband penetration has increased in most countries in 2017 in comparison to 2016[35].

Figure 31 - Fixed broadband penetration 2017 vs. 2016



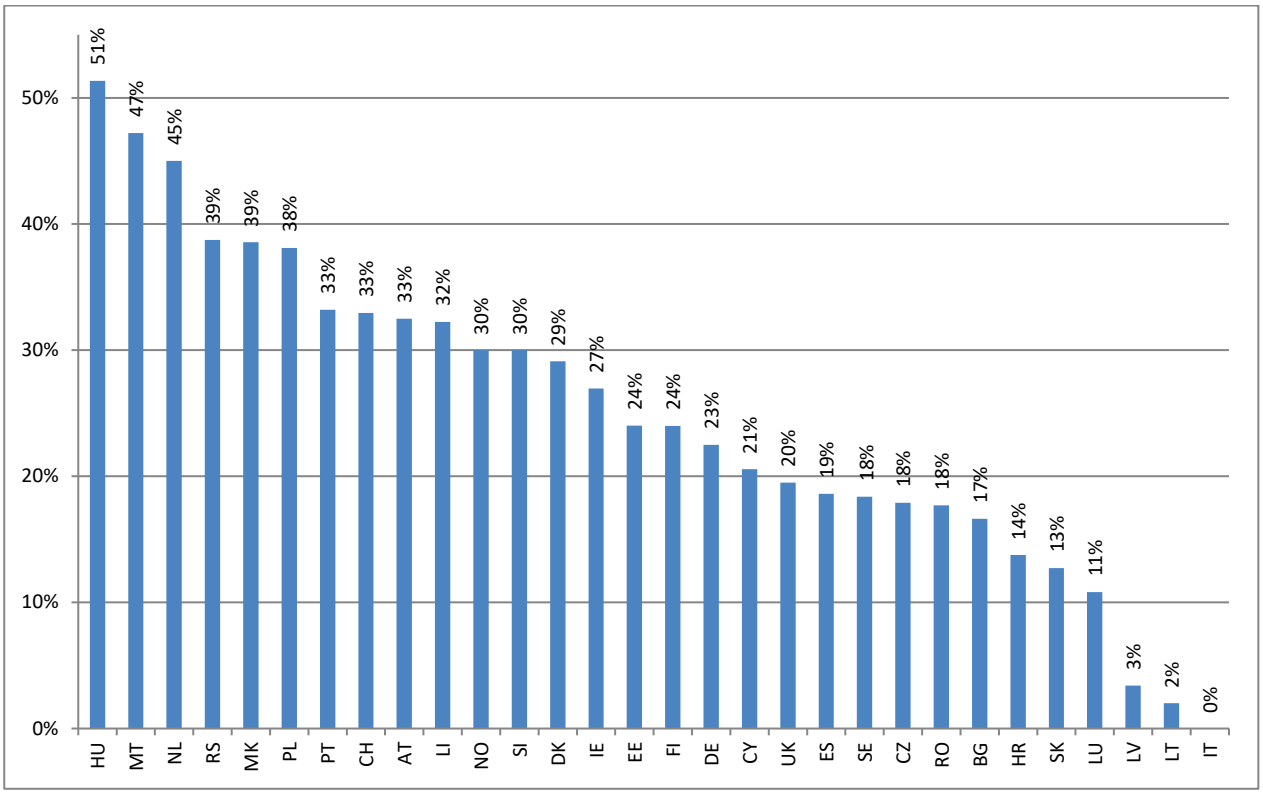
Source: BEREC 2016 and 2017

It should be pointed out that, while the fixed broadband penetration continues to increase, this is not necessarily associated with increasing average revenues.

[35] A comparison is only possible where countries have provided data in 2016 and 2017

Cable modems as a percentage of fixed broadband[36] range from 2 per cent in Lithuania (no cable coverage in Italy) to over 50 per cent in Hungary. The top 10 countries with a penetration of above 30 per cent are HU, MT, NL, RS, MK, PL, PT, CH, AT, LI.

Figure 32 - Fixed broadband: percentage of cable modems

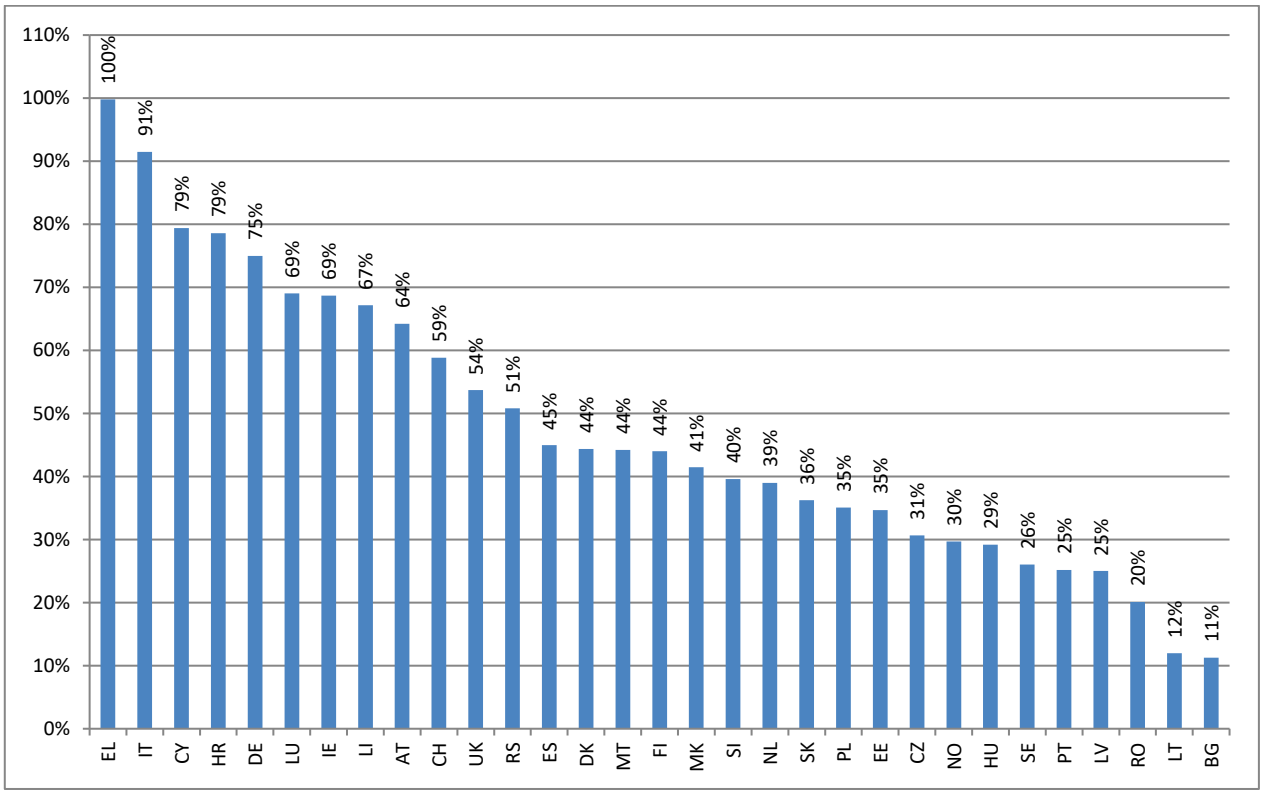


Source: BEREC 2017

[36] Data in BE and FR are confidential. No cable coverage in Italy.

DSL lines as a percentage of fixed broadband[37] range from 11 per cent in Bulgaria to 100 per cent in Greece. The top 10 countries – a mix of the smallest and the largest countries in terms of total population – have a percentage of above 55 per cent: EL, IT, CY, HR, DE, LU, IE, LI, AT, CH.

Figure 33 - Fixed broadband: percentage of DSL lines

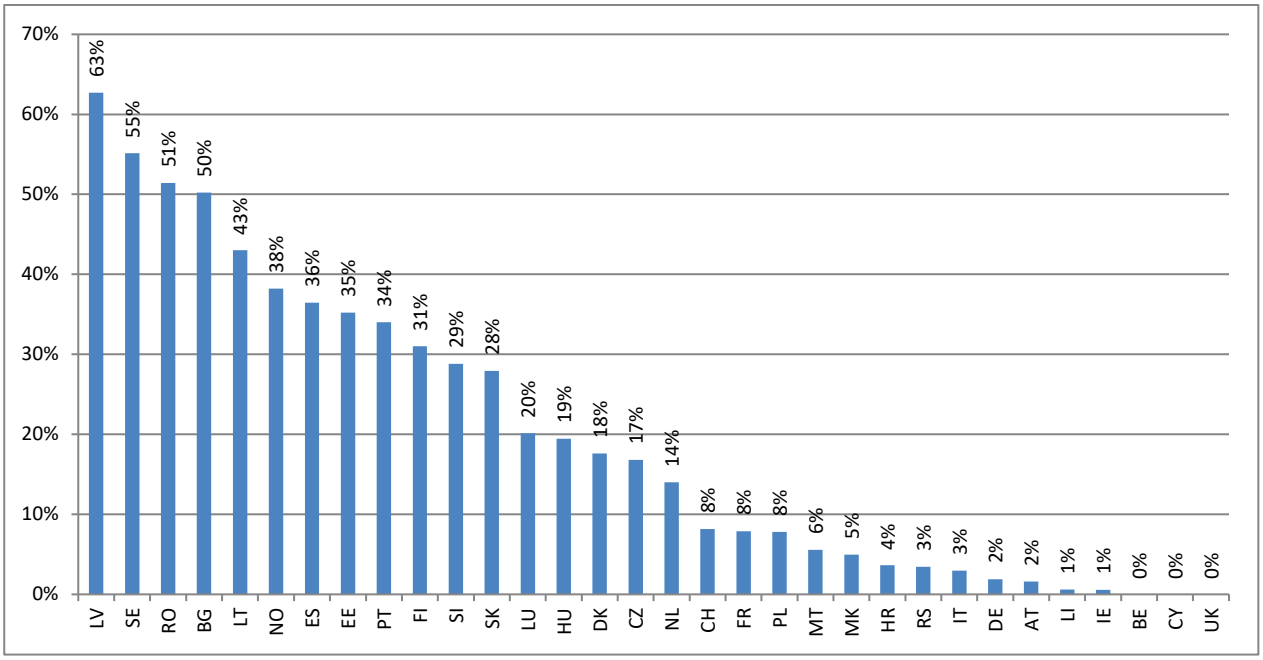


Source: BEREC 2017

[37] Data in BE and FR are confidential.

FTTH/B as a percentage of fixed broadband[38] ranges from 0 per cent in Belgium, Cyprus and the UK to more than 60 per cent in Latvia. The top 10 countries (amongst them 6 Baltic/Scandinavian countries) with more than 30 percentage points are LV, SE, RO, BG, LT, NO, ES, EE, PT, FI.

Figure 34 - Fixed broadband: percentage of FTTH/B



Source: BEREC 2017

[38] Data in EL are confidential.

4.3 Network infrastructure

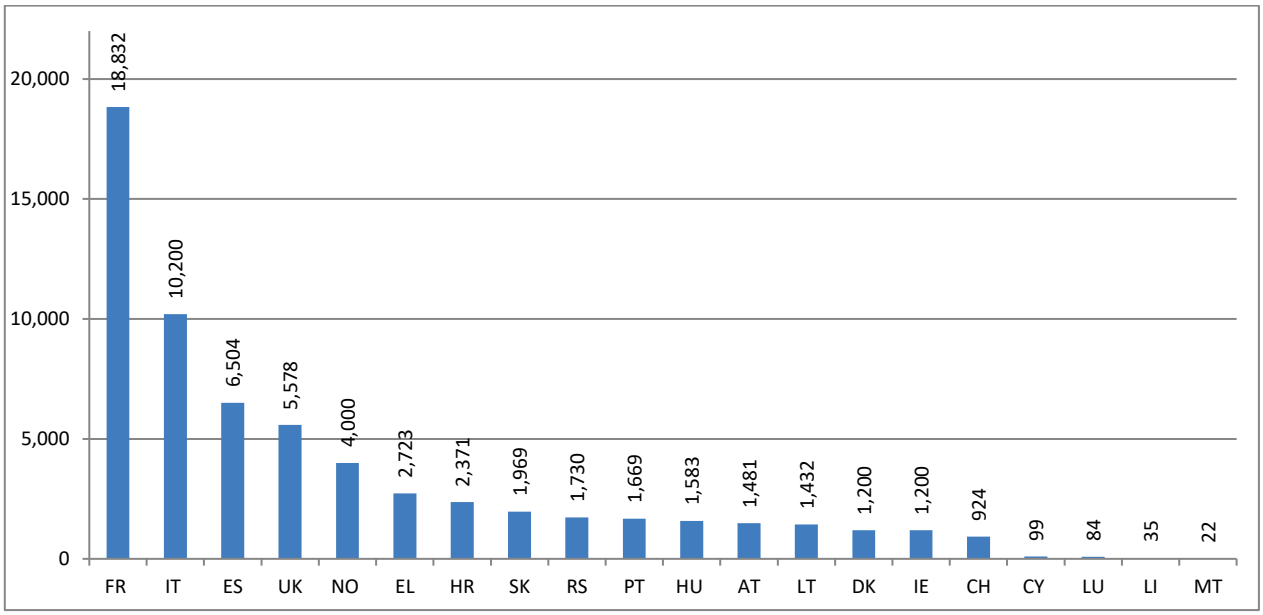
The number of main distribution frames (MDF), street cabinets, length of local loop, feeder or distribution cables is highly dependent on the size and shape of a country, the number and density of its inhabitants and the (often historically established) infrastructure in place.

Some countries also have a proportion of poles in their access networks which are not recorded here. This data will remain largely static unless significant changes in the access infrastructure occur (i.e. All-IP network rollout).

Non-anonymised data are shown for the first time in 2017, however not many NRAs have provided data for this section (confidential data is not included). Therefore this section only allows a snapshot of single countries rather than a comprehensive overview of the differences in network structure within European countries.

The total number of MDF[39] ranges from a minimum of 22 in Malta to a maximum of 18,832 in France.

Figure 35 - Number of MDF

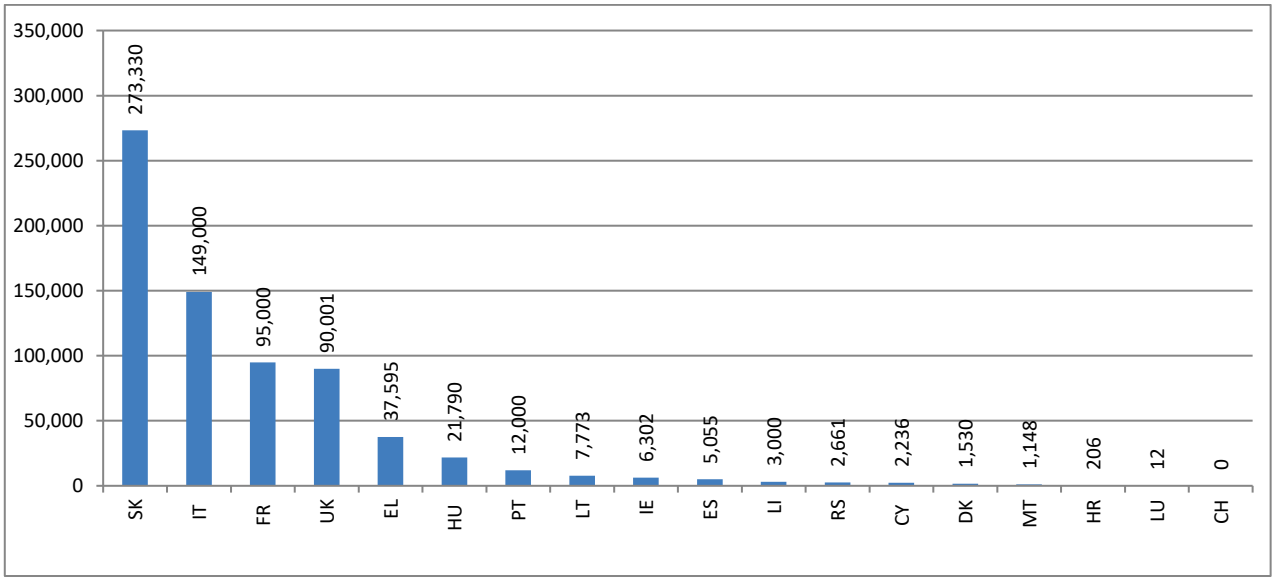


Source: BEREC RA database 2017

[39] Data are confidential in BE, CZ, DE, EE, NL, RO, SI. Data are not available in BG, FI, LV, MK, PL, SE. IE data are based on incumbent's network.

The number of street cabinets[40] range from a minimum of 0 in Switzerland to a maximum of 273,330 in Slovakia.

Figure 36 - Number of street cabinets

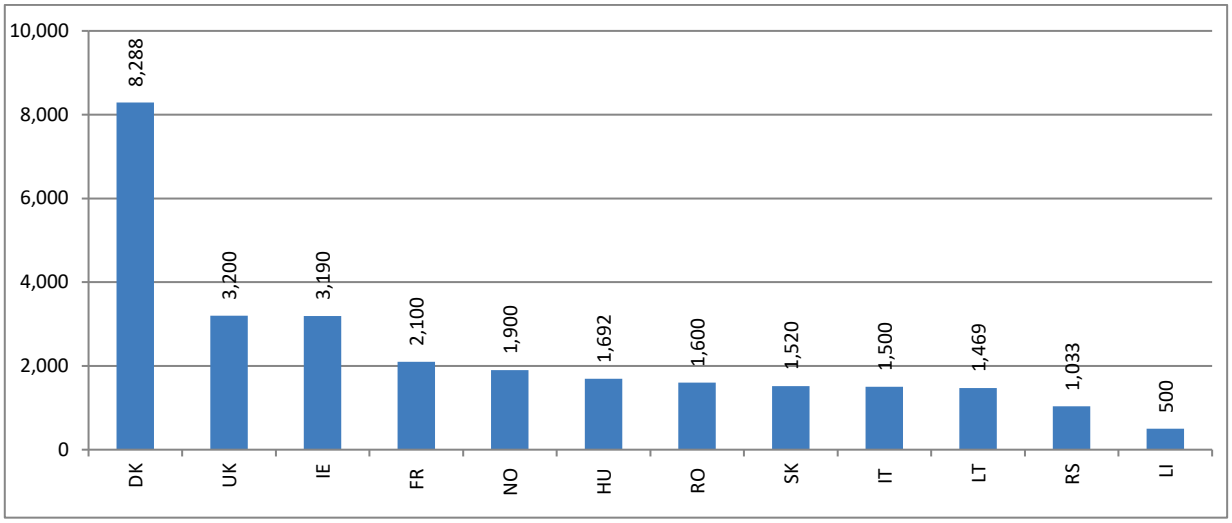


Source: BEREC RA database 2017

[40] Data are confidential in BE, CZ, DE, EE, NL, PL, RO. Data are not available in AT, BG, FI, LV, MK, NO, SE, SI. EL data is incumbent data. IE data are based on ComReg calculation.

The total average length of the local loop[41] is between a minimum of 500 metres in Liechtenstein and a maximum of more than 8,000 metres in Denmark.

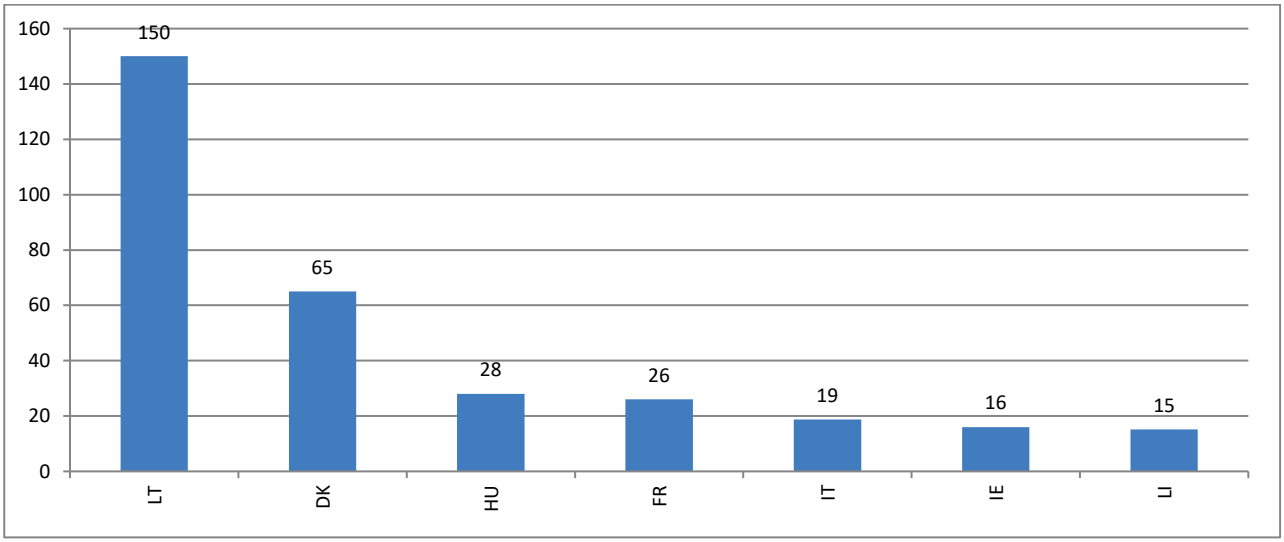
Figure 37 - Local loop: average length in metres



Source: BEREC 2017

The average trench metre per active subscriber line[42] is between a minimum of 15 in Liechtenstein and a maximum of 150 metres in Lithuania.

Figure 38 - Average trench metre



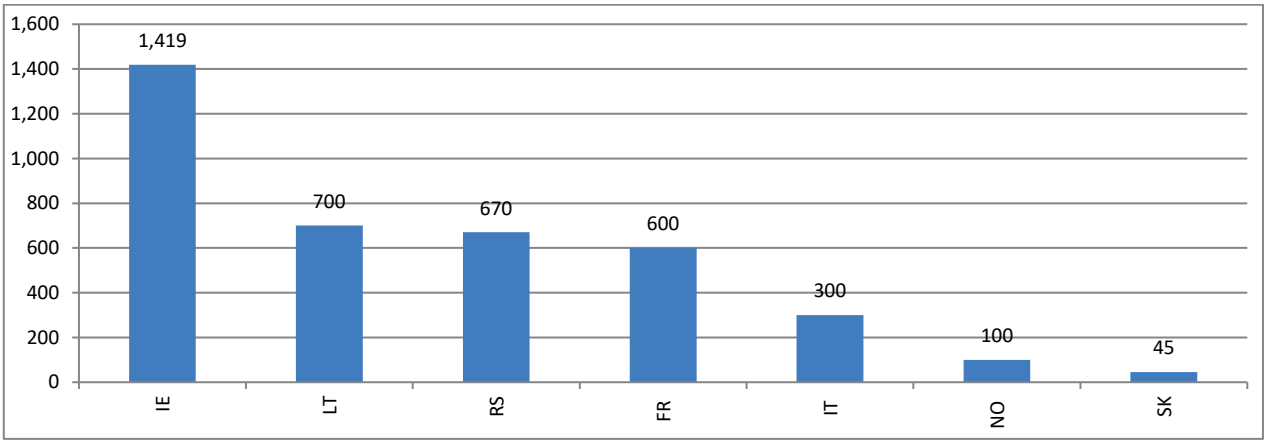
Source: BEREC 2017

[41] Data are confidential in BE, CH, CZ, DE, EE. Data are not available in AT, BG, CY, EL, ES, HR, LU, LV, MK, MT, NL, PL, PT, SE, SI. IE data are calculated by ComReg. NO data are an average of the provided maximum and minimum length

[42] Data are confidential in BE, CH, CZ, DE, RO. Data are not available in AT, BG, CY, EE, EL, ES, FI, HR, LU, LV, MK, MT, NL, NO, PL, PT, RS, SE, SI, SK, UK. IE data are calculated by ComReg: trench length divided by incumbent subscribers. IT data are calculated: km of trench and pole / engaged lines.

The total average length of the distribution cable[43] is between a minimum of 45 metres in Slovakia and a maximum of 1,419 metres in Ireland.

Figure 39 - Distribution cable: average length in metres



Source: BEREC 2017

4.4 Civil engineering and duct sharing

Civil engineering, i. e. laying ducts and cables is an important cost component within the telecommunications industry. Substantial cost savings may be realised if the cost for deploying infrastructure can be split between utilities such as water, electricity and telecommunications via duct sharing. Only few NRAs have provided data in this section, which does not enable a comprehensive overview of possible cost disparities in different countries. The few data concerning duct sharing may lead to the assumption that duct sharing is not yet available or not yet commonly used in most countries.

First we analyse the ***proportion of cables laid in cable ducts (cable conduit) to cables laid in the ground (buried cable) within the feeder section of the cable***[44] (i.e. between MDF and the street cabinet). **Error! Reference source not found.** shows that 5 of the 8 respondents have all or most cable in a cable duct, whereas 3 others have predominantly buried cable.

[43] Data are confidential in BE, CH, CZ, DE, RO. Data are not available in AT, BG, CY, DK, EE, EL, ES, FI, HR, HU, LI, LU, LV, MK, MT, NL, PL, PT, SE, SI, UK. IE data is calculated by ComReg. NO data shows the maximum of 100 m.
[44] Data in RO are confidential. Data are not available in AT, BG, CY, CZ, DK, EE, EL, ES, FI, HR, HU, IT, LU, LV, MK, MT, NL, NO, PL, PT, SE, SI, UK. IE has only an immaterial amount of buried cable.

Table 14 – Feeder cable: proportion of cable ducts to buried cable

Country	Per cent in cable ducts	Per cent of buried cable
CH	100 %	0 %
DE	15 %	85 %
RS	30 %	70 %
SK[45]	0-30 %	50-95 %
FR	90 %	10 %
BE	80 %	20 %
LI	99 %	1 %
LT	68.3 %	31.7 %

Source: BEREC 2017

The analysis of the ***proportion of cables laid in cable ducts (cable conduits) to cables laid in the ground (buried cable) within the distribution section of the cable***[46] (i. e. between the street cabinet and the customer site) shows that out of the 8 respondents 3 have all or almost all cable laid in cable ducts, while 3 have predominantly buried cable:

Table 15 – Distribution cable: proportion of cable ducts to buried cable

Country	Per cent in cable ducts	Per cent of buried cable
CH	100 %	0 %
DE	3 %	97 %
RS	8 %	92 %
SK[47]	0-5 %	15-90 %
FR	100 %	0 %
BE	0 %	100 %
LI	99 %	1 %
LT	68 %	32 %

Source: BEREC 2017

Looking at the ***proportion of feeder to distribution cable***[48] the number of responses dwindles to four. There is a wide disparity between the proportion of feeder to distribution cables amongst the respondents, presumably influenced by the country structure.

Table 16 – Proportion of Feeder to Distribution cable

Country	Feeder cable	Distribution cable
FR	25 %	75 %
RS	35 %	65 %
SK	97 %	3 %
BE	80 %	20 %

Source: BEREC 2017

[45] Depending on rural or urban areas

[46] Data in BE, CH, DE are confidential. Data are not available in AT, BG, CY, CZ, DK, EE, EL, ES, FI, HR, HU, IT, LI, LU, LV, MK, MT, NL, NO, PL, PT, SE, SI, UK. In IE the amount of buried cable is immaterial.

[47] Depending on rural or urban areas

[48] Data in BE, CZ, DE, RO are confidential. Data are not available in AT, BG, CY, DK, EE, EL, ES, FI, HR, HU, IT, LI, LT, LU, LV, MK, MT, NL, NO, PL, PT, SE, SI, UK. In IE the amount of buried cable is immaterial.

Very limited information is obtained from NRAs on ***duct sharing***, possibly owing to the fact that it is not commonly known or applied. There is no ***duct sharing with other services***[49] in Slovakia and the UK and it is less than 10 per cent in Norway but 50 per cent in Switzerland. In terms of the percentage of ***duct sharing per feeder and distribution cables***[50] there was no information from NRAs.

Switzerland is the only country that estimates an ***average cost saving***[51] of 25 per cent, shared equally between utility and telecommunications provider.

Naturally, the percentage of duct sharing and cost saving was nil where duct sharing is not available or where no ducts are deployed.

4.5 Subscriber shares (Broadband)

This section looks at the market and competitive situation in the increasingly important broadband market, i. e. the shares of subscriptions of the SMP operator vs. the shares of alternative operators (competitors) and cable operators. This includes DSL and NGA (FTTx) broadband subscriptions. The particular situation in each country has an effect on each country's regulatory effort. Since the data analysis shows a considerable disparity in market shares and therefore the competitive situation within each country, different regulatory approaches seem appropriate.

Data on NGA (FTTx) broadband subscriptions are collected and analysed for the first time in this report. All data in this section are shown in a non-anonymised form in 2017, therefore results cannot be compared to the anonymised 2016 data. Sensitive data (around 20 per cent of responses) are not shown.

Error! Reference source not found. shows the ***SMP operator's and the cable operator's share of fixed broadband subscriptions.***[52] From these figures a share for the non-cable competitors is derived. The SMP operator's share ranges from a minimum of 26 per cent in the Czech Republic to a maximum of 64 per cent in Luxemburg. Shown in the same figure are the ***cable operator's shares***[53]. There are no cable operators in Greece and Italy. The remaining competitor's shares range from a minimum of 3 per cent in Malta to a maximum of 66 per cent in Lithuania.

[49] Data are confidential in RO. Data are not available in AT, BE, BG, CY, CZ, DE, DK, EE, EL, ES, FI, FR, HR, HU, IT, LI, LT, LU, LV, MK, MT, NL, PL, PT, RS, SE, SI. In IE the amount of buried cable is immaterial.

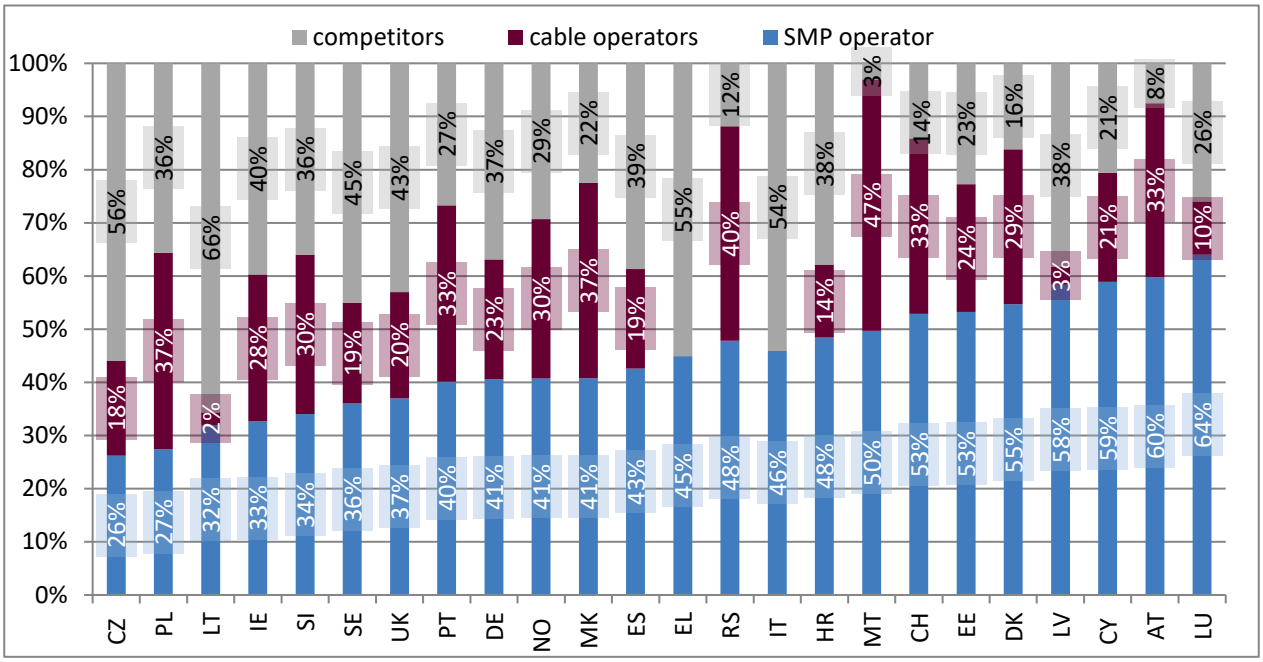
[50] Data are confidential in CH, DE, RO. Data are not available in AT, BE, BG, CY, CZ, DK, EE, EL, ES, FI, FR, HR, HU, IT, LI, LT, LU, LV, MK, MT, NL, NO, PL, PT, RS, SE, SI, UK.. In IE the amount of buried cable is immaterial

[51] Data are confidential in DE, RO. Data are not available in AT, BE, BG, CY, CZ, DK, EE, EL, ES, FI, FR, HR, HU, IT, LI, LT, LU, LV, MK, MT, NL, NO, PL, PT, RS, SE, SI, SK, UK. In IE the amount of buried cable is immaterial

[52] SMP operator's data is confidential in BE, BG, FR, NL, RO, SK. HU data (not shown) of 66,9 % is 3 SMP operators' aggregated data (MT, Invitel, UPC). LI: the SMP operator also offers cable broadband and one of the cable operators also offers DSL broadband. Thus SMP and alternative providers of broadband subscriptions cannot be distinguished by technologies (DSL, cable, FTTX).

[53] Cable operator's data are confidential in FR, NL, SK and not available in FI. BE (not shown) = 51,10 %. HR data is % cable of total fixed broadband subscriptions. HU share (not shown) of 53,06 % includes UPC, DIGI cable operators' all types of broadband subscriptions. RO data of 17,7 %: cable operators are also using other technologies, such as FTTH or FTTx+UTP/FTP; the reported value reflects the share of cable lines (including FTTx+cable) in total FBB lines.

Figure 40 - Fixed broadband: subscriber shares



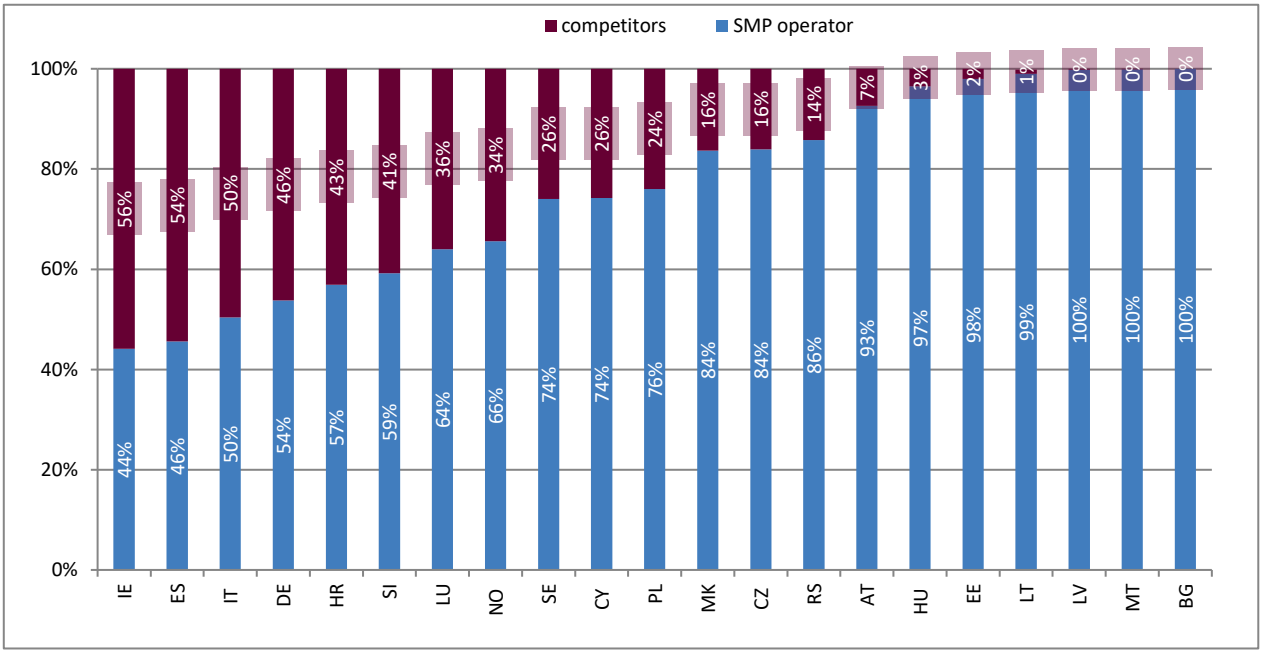
Source: BEREC 2017

Looking at ***DSL broadband subscriptions***, the SMP operator's shares[54] are traditionally high. Only three (IE, EL, ES) of a total of 21 respondents have a SMP operator's share of or less than 50 per cent; the minimum is at 44 per cent in Ireland. Shown in the same figure are the corresponding competitor's shares[55].

[54] Data are confidential in BE, DK, FR, NL, PT, RO, SK, UK. Data are not available in CH, FI. HR data includes VDSL. LI: the SMP operator also offers cable broadband and one of the cable operators also offers DSL broadband. Thus SMP and alternative providers of broadband subscriptions cannot be distinguished by technologies (DSL, cable, FTTX).

[55] Data are confidential in BE, DK, EL, FR, NL, PT, RO, SK, UK. Data are not available in FI. Data for EL was omitted since no share was provided for competitors.

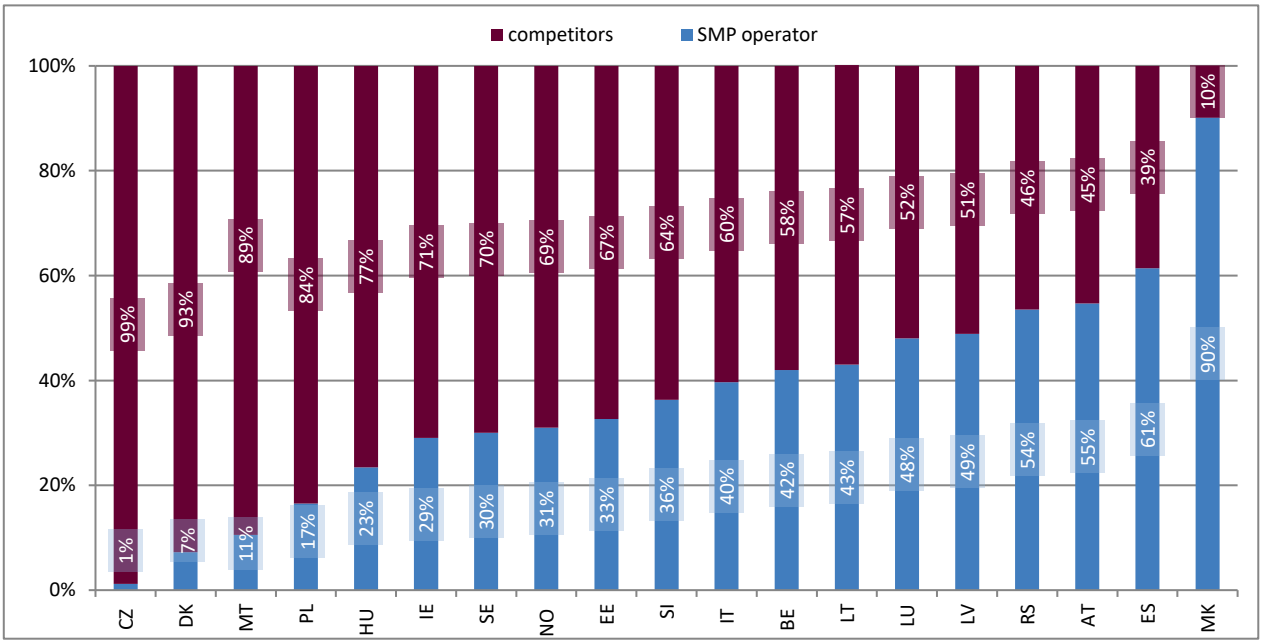
Figure 41 - DSL broadband: SMP operator and competitor shares



Source: BEREC RA database 2017

Quite a different picture provides the analysis of ***NGA (FTTx) broadband subscriptions***[56] The SMP operator's shares are considerably lower (below 50 % in 15 of the 19 respondents) and range from 1 per cent in the Czech Republic to 90 per cent in Macedonia. Shown in the same figure are the competitor's shares[57].

Figure 42 - NGA broadband: SMP operator and competitor shares



Source: BEREC RA database 2017

5 The Weighted Average Cost of Capital (WACC) (go to file B)

[56] Data are confidential in BG, FR, NL, PT, RO, SK, UK. Data are not available in CH, CY, DE, FI. BE data excludes VDSL. EE data includes FTTx and cable broadband. In LI the SMP operator also offers cable broadband and one of the cable operators also offers DSL broadband, thus SMP and alternative providers of broadband subscriptions cannot be distinguished by technologies (DSL, cable, FTTX). HR and EL data were omitted since they were not conclusive.
[57] Data are confidential in BG, FR, NL, PT, RO, SK, UK. Data are not available in CH, CY, DE, FI.

Appendix 1

A.1 Countries participating in the 2017 survey

1.	Austria
2.	Belgium
3.	Bulgaria
4.	Croatia
5.	Cyprus
6.	Czech Republic
7.	Denmark
8.	Finland
9.	France
10.	Germany
11.	Greece
12.	Hungary
13.	Ireland
14	Iceland
15.	Italy
16.	Latvia
17.	Liechtenstein
18.	Lithuania
19.	Luxemburg
20.	Malta
21.	Norway
22.	Poland
23.	Portugal
24	Republic of Estonia
25	Republic of Macedonia
26.	Republic of Serbia
27.	Romania
28.	Slovakia
29.	Slovenia
30.	Spain
31	Sweden
32.	Switzerland
33.	The Netherlands
34.	United Kingdom

Appendix 2

References

- COMMISSION RECOMMENDATION of 19 September 2005 on accounting separation and cost accounting systems under the regulatory framework for electronic communications (2005/698/EC).
- COMMISSION RECOMMENDATION of 7 May 2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU (2009/396/EC).
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Appendix 3

General terms

1. **Regulatory cost accounting:** Regulatory cost accounting is an accounting system with specific regulatory rules and conditions under which the costs, the revenues and the capital employed of services and activities have to be recorded. Regulatory cost accounting is often derived from the statutory accounting system of the regulated operator but includes specific regulatory rules and standards in addition to the rules and standards provided for by the Generally Accepted Accounting Principles. The regulatory cost accounting system must respect the principles of cost causality, objectivity, consistency and auditability. A regulatory cost accounting obligation may be imposed by the regulator on operators with significant market power.

2. **Accounting separation:** An accounting separation system is a comprehensive set of accounting policies, procedures and techniques that demonstrates compliance with non-discrimination obligations and the absence of anticompetitive cross-subsidies from a vertically integrated regulated operator. The outputs from such a system must be capable of independent verification (auditable) and fairly present the financial position and relationship (transfer charge arrangements) between the wholesale and retail activity of the vertically integrated operator. As the regulatory cost accounting system, the accounting separation system must respect the principles of cost causality, objectivity, consistency and auditability. An accounting separation obligation may be imposed by the regulator, together with a regulatory cost accounting obligation, on operators with significant market power.

3. **Forward looking cost:** The economic cost of an activity is the actual forward-looking cost of accomplishing that activity in the most efficient possible way, given technological, geographical, and other real world constraints that exist. In contrast to embedded costs, forward-looking costs are those associated with present and future uses of the firm's resources. Only these costs are relevant for making present and future production and investment decisions, for placing resources in alternative uses, and for setting prices for the services to be provided at current time or in the future.[58]

4. **Cost model / Costing methodology:** The cost model / costing methodology contains all the rules and guidelines on how to derive the relevant cost (cost base, depreciation methodology) for regulatory purposes and how to attribute those costs (allocation methods) to the regulated services.

[58] This definition comes directly from the ITU Regulatory Accounting Guide.

Terms related to the cost base and asset valuation methodologies

5. **Cost base:** The cost base is the relevant set of costs that can be attributed, directly or indirectly, to a given activity or to the production of a service. Two main approaches exist in terms of assessment of the cost base:

   5.1. **Top-down:** In a top-down (TD) approach, the accounted costs of the operator's regulatory accounts are used in order to assess the relevant regulatory cost base for a given activity or service or for a set of activities or services. A top-down approach usually implies that the actually incurred costs are taken into account, i.e. without efficiency adjustments.

   5.2. Bottom-up: In a bottom-up (BU) approach, an engineering model which satisfies the expected demand in terms of subscribers and/or traffic for a given service or for a set of services is used in order to assess the relevant regulatory cost base for such service or set of services. A bottom-up approach usually implies calculating the costs an efficient operator would incur.

6. **Capital expenditures (CAPEX):** Capital expenditures are investments in fixed, physical, non-consumable assets, such as infrastructures and equipment.

7. **Capital costs:** Capital costs are the annual costs originated by capital expenditures (CAPEX) and recorded in firm's accounts in the form of annuities. Annuities include two components: depreciation, which correspond to the depreciation of the value of the asset, and cost of capital employed, which corresponds to the cost of holding the capital i.e. the opportunity cost of the sum invested.

8. **Operating expenditures (OPEX):** Operating expenses or operating expenditures are the on-going costs for running a product, business, or system by the firm. In firm's accounts or in bottom-up models, those expenses are the sum of the expenses made over a period of time, generally a year.

9. **Gross replacement costs:** Gross replacement cost (GRC) are the price that would be paid on a given date for an asset bought in the past. It is calculated based on the recorded technical progress rate for such asset. The net replacement cost is equal to the gross replacement cost net of accumulated depreciation.

10. **HCA:** In an historical cost accounting (HCA) approach, the actually incurred costs recorded in the regulated operator's statutory accounts, most often annualized following a straight-line depreciation methodology, are used in order to assess the relevant regulatory cost base. As historical costs may include inefficient investments, incorporate tax optimisation and may especially lack data of the pre-liberalisation era, adjustments might be applied.

11. **CCA:** In a current cost accounting (CCA) approach, the operator's asset base is annualised based on the gross replacement cost of the assets. CCA belongs to the family of constant annualisation methodologies where the depreciation share is stable and the cost of capital share decreases over time, resulting in decreasing annuities. Nevertheless, unlike historical

cost accounting, in current cost annualisation methods the amortization is adjusted according to variations in the price of the assets being considered due to technical progress and general variations in price (inflation). Three main kinds of CCA exist:

11.1. **FCM:** Financial capital maintenance (FCM): CCA FCM aims to maintain the enterprise's financial capital: whatever transpires the sum of the discounted annuities must be equal to the initial investment

11.2. **OCM:** Operating capital maintenance (OCM): under CCA OCM it is the gross replacement value, in other words the current price of an asset with the same productive output, expressed in constant Euros, which is amortised.

11.3. **MEA:** Modern equivalent asset (MEA): refers to assessing costs of a network rolled-out today, i.e. reflecting modern least cost technology instead of legacy technology, as this would be the cost relevant in a competitive market.

Terms related to cost annualisation methodologies

12. **Annualisation methodology:** As capital expenditures are intended to create future benefits for the firm, they are annualised in firm's accounts by means of annualisation methodologies. Annualisation methodologies spread investment costs over time based on regulatory assets lives and, for every asset, they result in a series of annualised costs (called annuities), each of which corresponds to the portion of the investment cost allocated to the year.

13. **Straight-line (linear) depreciation:** Straight line depreciation belongs to the family of constant depreciation methodologies. In these methodologies, the depreciation share is stable and the cost of capital share decreases over time which results in decreasing annuities. Constant depreciations not readjusted for price evolution are usually referred to as "linear depreciation".

14. **Annuity:** The annuity methodology calculates the charge that, after discounting, recovers the asset's purchase price and financing costs in equal annual costs. At the beginning, the payment will consist more of capital payments and less of depreciation charges, while over time it will be the opposite, resulting in an upward sloping depreciation schedule (increasing depreciation charges).

15. **Tilted annuity:** The tilted annuity methodology is an annuity methodology where the annuity value changes from year to year at the same rate as the price of the asset is expected to vary. When asset's price is expected to change over time, a tilted annuity methodology would be more appropriate than a flat annuity methodology.

16. **Economic depreciation:** The economic depreciation methodology takes into account both price changes and output changes. It becomes more appropriate when, besides asset's price changes, there is an expectation of changes in output which may affect unit costs evolution.

Terms related to cost allocation methodologies

17. **Allocation methodology:** Allocation methodologies are used to assess the cost of individual services/products in the context of a multi-product firm. The choice of a particular method

depends on the objectives and the competitive environment. The implementation of one particular allocation methodology has a significant impact on the costs of a service/product and, therefore, on the regulated wholesale prices as well.

18. **Fully distributed cost (FDC) / fully allocated cost (FAC):** Using the fully distributed cost or fully allocated cost approach, the total costs of a product or service are taken into account, i.e. the costs actually incurred by the operator. These include a share of the joint and overhead costs, arrived at by applying certain allocation bases. Thus, in contrast to the marginal cost approach, fixed costs independent of output are also taken into consideration. Usually also parts of joint and common cost are included in the calculation.

19. **Long run incremental cost (LRIC):** Long run incremental cost is the cost of producing a specific additional increment of a given service in the long run (the period over which all costs are variable) assuming at least one other increment is produced. It includes all the directly assignable variable economic costs of a specific increment of service, which is usually less than the whole service. In principle, there are an infinite number of different sized increments that could be measured. However, these increments can effectively be grouped into three different categories: 1. a small change in the volume of a particular service; 2. the addition of a whole service; or 3. the addition of a whole group of services.

20. **Long run average incremental cost (LRAIC):** Long run average incremental cost is a form of LRIC where the Increment is a whole group of services. In the context of telecommunications, LRAIC has often been used to set interconnection charges with the increments usually defined as the whole group of services using the core network. These services (PSTN, leased lines, etc.) include those provided by the operator with significant market power, as well as those of interconnecting operators. The costs of the network providing this wider group of services are then divided by all traffic to produce the average incremental cost.

21. **LRIC and its several variations:** The LR(A)IC acronym is also used in conjunction with Forward-Looking (FL) and the plus sign (+). In principle this additions lead to a more specific description of all the elements which add up to the cost model as a whole. In this sense the FL would imply the bottom-up cost base according to a current cost accounting is used and the + would imply that joint and common costs are taken into account in the cost allocation process, too. Incremental costs are generally calculated for an efficient operator.

22. **Stand alone cost (SAC):** Measures the cost of providing a service provided by the operator separately from the other services of the company. SAC includes all directly attributable costs and all shared cost categories related to production of the service, thus including direct variable costs, direct fixed costs, common and joint costs. Under this allocation method, the shared costs are totally supported by the service that is to be provided in isolation.

23. **Embedded direct cost (EDC):** Considers the directly attributable and indirectly attributable volume sensitive and fixed costs as recorded in the books and records of a firm. It therefore measures the embedded cost provided by the statutory accounts and does not question the efficiency involved.

Terms related to price control methodologies

24. **Price control methodology:** The price control methodology designates the approach that regulators adopt in order to set tariffs of regulated services. The most common approaches are cost orientation, retail minus, price-cap and benchmarking.

25. **Cost orientation:** Under cost orientation, the regulated price charged for the provision of a service reflects the underlying relevant regulatory costs, as defined by the regulator.

26. **Retail minus:** Under retail minus, the wholesale price charged for a given service is set in relation to the price of the underlying retail service rather than calculating the wholesale price on the basis of the costs incurred in producing the wholesale service.

27. **Price-cap:** Under price-cap, the regulator sets a cap on the price that the regulated operator may charge for a given service or for a basket of services. The cap may be set based on a top-down or on a bottom-up approach and may evolve according to several economic factors. The basic formula employed to set price caps is CPI – X, where the expected efficiency savings X are subtracted from the rate of inflation, measured by the Consumer Price Index (CPI). This price control methodology is intended to provide incentives for efficiency savings, as any savings above the predicted rate X can be kept by the operator and passed on to shareholders. In Europe, price-caps are generally reviewed every three years, corresponding to the length of validity of market analysis.

28. **Benchmarking:** Under benchmarking, the price of a given service is set in relation to the prices of comparable services charged in other countries.

Terms related to WACC

29. **Nominal Risk Free Rate (RFR):** The risk free rate is the thoretical rate of return of an investment without volatility and so without any financial risk. Financial analyst generally refer that a good proxy of rate of return of risk free investment can be the rate of return of a country bond in stable economic conditions.

30. **Cost of debt (RFR+ Debt premium) (pre-tax):** The cost of debt is the cost that an undertaking incurs to found its activities by resorting to third-party capital (bond, bank loans etc.).

31. **Beta:** Following the capital asset pricing model (CAPM), the beta (equity) is the systematic risk (market risk) of a given equity security and provide a measure about how much his yield perform with respect to the reference whole market yield.

32. **Equity risk premium (ERP):** The Equity Risk Premium (ERP) represents the excess return, compared to the return on a risk free rate, required by investors as compensation for the risk of investing in the stock market.

33. **Tax rate (corporate):** is the total theoretical rate of incidence of taxes on the profit of the undertakings, necessary to evaluate the pre-tax WACC.

34. **Gearing:** The gearing ratio is the ratio between the Debt and the sum of Equity and Debt. It provides the weight for the cost of debt and equity in the WACC calculation. It can be generally estimated from the book value of the undertakings, or can be evaluated from the market value of equity and debt.
35. **WACC Nominal pre-tax:** The Weighted Average Cost of Capital is the rate that an operator is expecting to pay on average to all its security holders (equity and debt) to finance its assets including inflation and tax charge. The general formula can be expressed in the following way: (1-g)*Ce/(1-T)+g*Cd where g is the gearing ratio, Ce is the post-tax cost of equity and Cd is the pre-tax cost of debt, T is the Corporate tax rate.
36. **WACC Nominal post-tax:** The Weighted Average Cost of Capital is the rate that an operator is expecting to pay on average to all its security holders (equity and debt) to finance its assets including inflation. The general formula can be expressed in the following way: (1-g)*Ce+g*Cd.
37. **WACC Real pre-tax:** The Weighted Average Cost of Capital is the rate that an operator is expecting to pay on average to all its security holders (equity and debt) to finance its assets net of inflation including tax charge. It can be obtained from the nominal pre tax WACC applying the Fisher equation: (1+WACC_Nominal)/(1-Inflation rate)-1.
38. **WACC Real post-tax:** The Weighted Average Cost of Capital is the rate that an operator is expecting to pay on average to all its security holders (equity and debt) to finance its assets net of inflation and tax charge. It can be obtained from the nominal post tax WACC applying the Fisher equation: (1+WACC_Nominal)/(1-Inflation rate)-1.

Markets identified by Recommendation 2014/710/EU

Market 1: Wholesale call termination on individual public telephone networks provided at a fixed location.

Market 2: Wholesale voice call termination on individual mobile networks.

Market 3:

a) Wholesale local access provided at a fixed location.
b) Wholesale central access provided at a fixed location for mass-market products.

Market 4: Wholesale high-quality access provided at a fixed location.