

# **BEREC Report**

## **Regulatory Accounting in Practice 2021**

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## List of Abbreviations

### A

AD *Access Directive*

### C

capex *capital expenditure*

CAP-M *Capital Asset Pricing Model*

CCA *Current Cost Accounting*

### D

DEA *Digital Economic Agenda*

### E

EECC *European Electronic Communications Code*

ERT *Economic Replicability Test*

EWG *Expert Working Group*

### F

FDC *Fully Distributed Costs*

### H

HCA *Historic Cost Accounting*

### L

LLU *Local Loop Unbundling*

LR(A)IC *Long Run (Average) Incremental Cost*

LRIC *Long Run Incremental Cost*

### M

MDF *Main Distribution Frame*

MST *Margin Squeeze Test*

### N

NDCM *Non-discrimination Obligations and Costing Methodologies*

NRA *National Regulation Authorities*

### O

ODF *Optical Distribution Frame*

opex *operating expenditure*

### R

RA *Regulatory Accounting*

### S

SA *Shared Access*

SLU *Sub Loop Unbundling*

SMP *Significant Market Power (regulated operator)*

### T

TD *Top Down*

### V

VULA *Virtual Unbundled Local Access*

### W

WACC *Weighted Average Cost of Capital*

## 1. Executive summary

This is the seventeenth 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 (i) elements about structural parameters of each country, (ii) WACC methodologies applied by NRAs and WACC values currently in force.

The document offers 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 in the past years are illustrated.

The report focuses on the analysis of services in key wholesale markets: Wholesale Local Access (Market 3a/2014), Wholesale Central Access (Market 3b/2014) and Wholesale high quality access (Market 4/2014). Given that the cut-off date was 1<sup>st</sup> April, the Report does not yet refer to the 2020 Recommendation on relevant markets susceptible to ex ante regulation ((EU) 2020/2245).

For the fourth time the report also provides information about the regulatory and competitive framework in each member state, such as the presence of a geographical regulation, the equivalence model applied, the application of retail margin squeeze test, and the cable regulation. A brief analysis of symmetric remedies is included. Outcomes of the survey are simply reported in a descriptive form.

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

An evaluation of the implementation of the Recommendation 2013/466/EU on consistent non-discrimination obligations and costing methodologies is presented (par. 3.5).

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 (chapter 4).

In Chapter 5 the report delivers an extended survey on WACC parameters, mainly focusing on market 3a and on the mobile market. The WACC chapter summarises the main methodologies currently used by NRAs and sets out the reasons behind the estimation of single parameters needed to evaluate the cost of capital under the CAP-M model.

Appendix I contains a number of figures/tables providing further details on some of the analyses in the report.

### 1.1 Key findings

The Regulatory Accounting annual report gives an overview of the main remedies imposed on SMP operators in relevant markets susceptible to ex-ante regulation. Specific focus is given to the relevant costing methodologies, applied in relation to the corresponding price control schemes, adopted by NRAs for single products.

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 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 for few products). The degree of consistent application of methodologies in accordance with the EU Regulatory Framework continues to be high and accommodates the use of elements or parameters that reflect national circumstances.

The RA report 2021 provides an analysis more oriented on single products (increasing the scope of monitoring) with respect to the previous editions. The 2021 report collects in fact information for 23 main products (13 in 2015).

The regulation of legacy products in market 3a and 3b is more frequent: 90% of EU NRAs still maintain SMP remedies on ULL and 81% on market 3b over legacy copper network (the same as in the last year report). In case of FTTC the situation both on market 3a (VULA) and market 3b is substantially unchanged. In case of FTTH there is an increase in the number of NRAs that apply regulation both in market 3a and 3b through FLLU and Bitstream. The SMP regulatory remedies have been applied by NRAs generally towards a single SMP operator that is national in scope. In some cases the SMP regulation has been applied to more than one SMP operator.

The number of NRAs that face different competitive conditions across their national territory thus justifying a geographically differentiated approach (in terms of market definition or remedies application) has increased with respect to last year for most markets/products. An increased trend can be seen in market 3b, where the amount of NRAs that apply a geographically differentiated approach to regulation has increased, reaching about 50% of NRAs applying such regulation to the product/market for the legacy network and about 60% to market 3b over FTTH network. This is also the case for market 4 over NGA (Ethernet). In comparison to last year an increased trend in that direction can be seen also for products in market 3a.

Most NRAs apply the whole set of remedies when SMP regulation is imposed on a specific product/market, where access obligation in combination with non-discrimination are the most frequently applied remedies.

Within the copper network, ULL is still the most regulated product. Focusing on RA in general, accounting separation is often imposed together with the cost accounting obligation. Some NRAs consider it necessary to impose both obligations in order to ensure that robust regulatory accounting information is available for each product. This rationale is related to the fact that accounting separation is useful for vertically integrated undertakings by using cost models to supplement price control measures in order to prevent unfair cross-subsidies (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.

As a stable result during the past few years, cost orientation remains the most commonly used price control method and it is applied mainly for legacy products, while the retail minus category refers mainly to VULA and market 3b products (Figure 17).

ERT price control methodology is still mainly used complementarily to cost orientation, albeit a slightly increased use of the ERT at least for NGA/VHCN wholesale products as a price control method can be observed, suggesting it is a substitute with respect to cost orientation, in line with the Commission NDCM Recommendation (2013/466/EU) and the price flexibility tool according to the Code.

Cost orientation for FTTH is more frequent when a legacy network based on copper is still relevant for NGA products (FTTC), where a stronger relation of substitution with respect to a legacy copper

product may occur. In case no intermediate steps like FTTC for VHCN transition are in force, generally more flexibility is granted when regulating FTTH, also with the application of ERT. More in general, the relevance of the legacy copper network for NGA take up (e.g. the case of FTTC) appears to be correlated to the regulatory approach in terms of remedies imposed in access market as well as on the level of the price flexibility tool according to the Code, other than the application of non-discrimination rules such as EoI.

Overall, the application of EoI models is increasing over the years. The cumulative percentage of EoO and/or EoI is more frequent in relative terms in case of VULA (FTTH) as well as for market 3b.

With regard to the cost base CCA is by far the most commonly used methodology for all markets. The situation remains stable in comparison to last year.

The most frequent cost allocation approach is LRIC/LR(A)IC, for almost all products/markets. In the access market (market 3a) a preference for LRIC/LR(A)IC can be found. In general, when LR(A)IC/LRIC is chosen as the main category, the most common approach is Bottom-up. FDC is a frequent approach for Market 4 over legacy network. With respect to last year a reduction in the use of FDC can be detected also for Market 3b for legacy products and NGA products.

For copper LLU most NRAs apply a cost orientation alone/LRIC-LR(A)IC/CCA approach. Generally there is an increase in the use of the combination of cost orientation/price cap with BU-LRIC approach and a reduction of accounting methodologies based on FDC; TD approach is by far less frequent.

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.

Compared to the BEREC WACC parameters Report 2021 (BoR (21) 86), the present BEREC Regulatory Accounting Report WACC chapter (chapter 5) is of a more descriptive nature, aiming at reporting and analysing NRAs WACC calculations “as is” as well as showing the evolution over time, in line with previous versions.

Regarding the WACC, the in-depth survey and the update provided in this report (chapter 5) highlights that all NRAs use the Capital-Asset-Pricing-Model (CAP-M)<sup>1</sup> and hence similar parameters for determining the WACC. However, the value of these parameters naturally differs reflecting different national financial market conditions. The statistical analysis (regression) of the data shows – in line with the previous exercises – that the differences of the final WACC values over time are mainly explained by parameters in the WACC calculation that are more “country related” such as the RFR, ERP and Tax rate, with a less relevant role for “sector-specific” parameters such as beta, gearing and debt premium. This is consistent with survey results on “used methodologies” that confirm that beta, gearing and debt premium are estimated mainly on a “notional” basis (see also Appendix I of Ch. 5) by NRAs from a long time prior to the WACC Notice.

By taking into account only the most recent estimation along the time (last three most recent values for each NRA) in the pooled regression analysis, the results show that the ERP, that was the second most relevant parameter after RFR in explaining current WACC differences until last year, is becoming less relevant with respect to the “Tax” parameter in explaining the differences in final WACC values between NRAs since this year. This result is in line with the fact that the ERP estimation through a notional approach by most NRAs due to the application of the Commission Notice is reducing its spread. This is reflected in the time series panel data that has shown that the most relevant parameters are from this year RFR and Tax to explain the WACC differences, that are typically own

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<sup>1</sup> Cf. BoR (13) 110.



country parameters. It is the first time it has happened since 2017. ERP, beta, gearing and debt premium in this order of relevance provide a less important contribution to explaining differences in final WACC value if we take into account the most recent data estimation which shows that the application of the WACC Notice starts to have a material convergent effect.

Overall the 2021 data confirms a consistent approach to regulatory accounting. The latter indicates that NRAs are providing predictable regulatory environments in their countries. The convergence of regulatory accounting approaches for wholesale access markets needs to bear in mind that wholesale access markets are reflecting different national market situations and structural factors influencing the regulatory strategy.

## ***1.2 Future development***

As can be seen from the results above the Report confirms a trend towards a consistent application of regulatory accounting frameworks by NRAs. This also reflects convergence in the application of the 2013 Recommendation on consistent non-discrimination obligations and costing methodologies. In 2022 the report will continue to look at the application of regulatory accounting with respect to key access products (e.g. fibre) and will maintain an in-depth analysis of the methods as well as the national market situations in which they are applied. Further to this, the focus of the report will be adapted in the light of the EECC provisions given that the EECC were to be transposed by Member States by 21<sup>st</sup> December 2020. This implies looking in which way NRAs apply the updated provisions to deal adequately with the developments in markets and technology.

Regarding the WACC calculation, the report data will continue to be collected based on the methodology and input parameters actually used by NRAs to estimate the rate of return on capital employed, and the impact of both on the result will be considered. Furthermore, the convergence of WACC calculations through the application of the WACC Notice will be followed on.

## 2. Introduction

### 2.1 Background

The BEREC Regulatory Accounting EWG has been gathering and reporting data from NRAs to provide a high level picture on remedies in charge with more specific attention to the obligation of cost accounting, accounting separation and price control in European countries. The report also provides information on the regulatory context in which the obligation is imposed. The scope of the report is twofold: i) to provide a benchmark on regulatory accounting at a single access product level; and ii) to give an overview on how the supply and demand factors affect the choices of the regulatory framework specifically on price control and costing methodology as adopted by NRAs.

This is the seventeenth annual report summarising the results of the 2021 survey.

The report has been updated since 2005 in order to monitor trends in the degree of harmonisation of regulatory accounting systems across Europe.<sup>2</sup> Until 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 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.<sup>3</sup>

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, since 2013, also on how NRAs implement the principles of the Commission Recommendation on consistent non-discrimination obligations and costing methodologies (NDCM).<sup>4</sup>

In 2014 the Commission issued a Recommendation that further reduced the number of relevant markets focussing the report on specific products in each market.

In 2020 the Commission ran a targeted consultation on the review of the 2010 NGA Recommendation as well as on the 2013 NDCM Recommendation. BEREC submitted its response in October 2020 (BoR (20) 169).

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<sup>2</sup> BoR (20) 210 Regulatory accounting in practice 2020. Previous years (2005-2019):

- 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 accounting in practice 2016.
- BoR (17) 169 Regulatory accounting in practice 2017.
- BoR (18) 215 Regulatory accounting in practice 2018.
- BoR (19) 240 Regulatory accounting in practice 2019.

<sup>3</sup> 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.

<sup>4</sup> "Recommendation on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment (2013/466/EU)" (C(2013) 5761). 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 26<sup>th</sup> 2013, cf. Document BoR (13) 41.

A new Recommendation on relevant markets has been issued on 18<sup>st</sup> Dec. 2020 (C(2020) 875). In this report the taxonomy of the new Recommendation on relevant markets (C(2020) 875) has not been taken into account due to the fact that the cut-off date of the collected data was the 1<sup>st</sup> of April 2021. Thus markets and products refer to the Commission Recommendation of 2014.

## 2.2 Current report

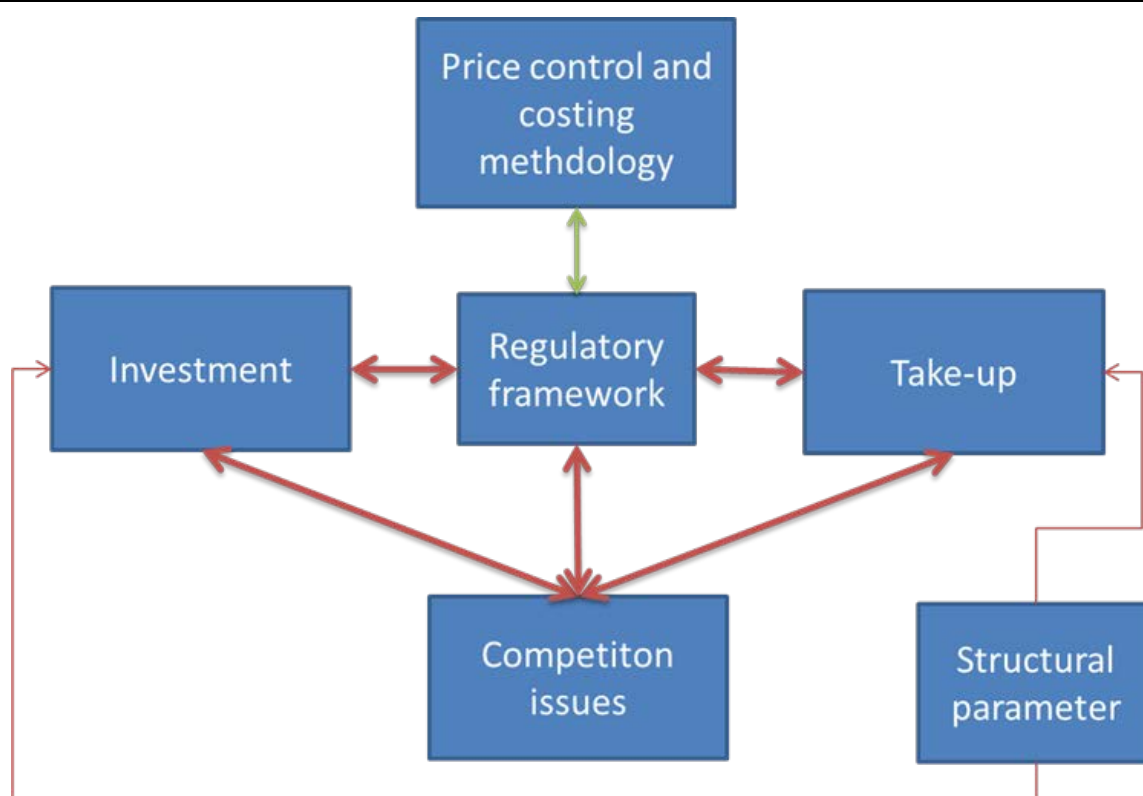
This report provides an update on the status of regulatory accounting systems across Europe. It monitors how regulatory accounting methods have been developed as a consequence of the adoption by NRAs of decisions regarding market analyses.<sup>5</sup>

The 2021 RA report has collected information on the following main elements, in continuity with the past years:

- i) Regulatory framework (Access regime/geographical regulation);
- ii) Cost assessment (cost orientation implementation; wholesale price; WACC and risk premium);
- iii) Competition indicators (i.e. market share of SMP operators);
- iv) Structural Parameters.

The following picture provides information about the main groups of elements that have been collected in the survey and the corresponding interaction diagram.<sup>6</sup>

Figure 1 - Information collected and main interactions



<sup>5</sup> The monitoring approach is based on a “survey” submitted by NRAs mainly based on predefined categories and subcategories of replies. In that sense the approach described for each country is standardised for statistical reasons. The chosen and agreed categories and sub categories give just an indication of the main approach in use that is articulated in each NRA’s decision reflecting own country specificity.

<sup>6</sup> The boxes connected with bold arrow include indicators that generally guide directly the decisions about the regulatory framework. Structural Parameters are generally external elements that influence the outcome in terms of investment and take-up of services, but they are not under direct control of the regulatory framework and they guide decisions indirectly. Green arrows refer to the focus inside the regulatory framework that is the core of the present report.

The report benefits from information collected from 31 NRAs (listed in Appendix I) with most NRAs responding to the majority of the questions, thus providing a solid base for further analysis and comparisons along the years.

The information provided in this report refers to those markets for which remedies are in force (last update 1<sup>st</sup> April 2021).

### **2.3 The data collection process**

As highlighted in the introduction, the collected information is targeted at single product level within the relevant market, reflecting the fact that the regulatory framework is mainly influenced by technological drivers, capital costs, business models for investment, demand side factors and national policy, thus addressing national specificities. In this context the 2021 report collects information on 23 main products as reported in Figure 2 (13 main products in 2015).

In combination with the “standard” SMP regulatory framework, the new EECC provided new regulatory instruments with the aim to facilitate the roll-out of new, very high capacity networks (VHCN). It addressed *inter alia*: (i) a focus on an infrastructure mapping database (i.e. Art. 22) ; (ii) rules for co-investment that will be more predictable and promote risk sharing in the deployment of VHCN; and (i.e. art. 76) (iii) specific rules for wholesale-only operators with significant market power (i.e. Art. 80).

In Art. 61 (3) subparagraph 1 of EECC, NRAs may impose obligations – upon reasonable request and regardless of any findings of significant market power (SMP) – thus granting access to wiring and cables and associated facilities inside buildings or up to the first concentration or distribution point as determined by NRAs. Access obligations may be imposed on electronic communication network (ECN) providers or owners of such network elements, where replication of the concerned network elements would be economically inefficient or physically impracticable. Where access obligations pursuant to Art. 61 (3) subparagraph 1 do not sufficiently address economic or physical barriers to replication, Art. 61 (3) subparagraph 2 of EECC authorises NRAs to extend the imposition of access obligations (including active or virtual access obligations if justified on technical or economical grounds) beyond the first concentration or distribution point up to a point capable of hosting a sufficient number of end-user connections to be commercially viable for efficient access seekers. BEREC has provided guidelines on the criteria for a consistent application of Art. 61(3) EECC in BoR (20) 225.

In every case behind those new addressed specificities, the standard Significant Market Power (SMP) regime remains at the cut-off date the key instruments for *ex ante* regulation.

In this context the report is targeted on SMP *ex ante* framework focalising the monitoring process on the products enumerated in Figure 2, in line with the collected information. At the same time it is relevant to understand if and how if the new instruments which are provided in the EECC code are already applied: i) symmetric regulation (art. 61 (3)); ii) co-investment (art. 76); iii) functional and voluntary separation (art. 77, 78); iv) wholesale-only lighter rules (art. 80).

Figure 2 - Market and products monitoring perimeter

Market/products	Definition
-----------------	------------

Symmetric regulation	M3a_2014_M4_2007_Terminating segment (in line with definition of Art. 61 (3)) symmetric regulation (please fill if you apply symmetric regulation even if the new code is still not adopted in your country)	Symmetric access to wiring and cables and associated facilities inside buildings or up to the first concentration or distribution point
	M3a_2014_M4_2007_Terminating segment (point beyond the first concentration point Art. 61 (3)) symmetric regulation (please fill if you apply symmetric regulation even if the new code is still not adopted in your country)	Symmetric access to wiring and cable and associated facilities beyond the first concentration point
Market 2		SMP Call origination on the public telephone network provided at a fixed location
Market 3a	M3a_2014_M4_2007_ULL	SMP Local loop unbundling service on copper network
	M3a_2014_M4_2007_SLU	SMP Sub loop unbundling on copper network
	M3a_2014_M4_2007_SA	SMP Shared Access service on copper network
Market 3a	M3a_2014_Optical terminating segment SMP regulation (in-house wiring)	SMP Access to wiring and cables and associated facilities inside buildings or up to the first concentration or distribution point
	M3a_2014_M4_2007_fiberLLU	SMP fiber local loop unbundling
	M3a_2014_M4_2007_VULA (FTTC)	SMP VULA on fiber to the cabinet network
	M3a_2014_M4_2007_VULA (FTTH)	SMP VULA on fiber to the home network
	M3a_2014_M4_2007_VULA (cable Docsis <3.0)	SMP VULA on cable docsis <3.0 network
	M3a_2014_M4_2007_VULA (cable Docsis >3.0)	SMP VULA on cable docsis >3.0 network
	M3a_2014_M4_2007_DF M3a_2014_M4_2007_DA	SMP Dark fiber SMP Duct access
Market 3b	M3b_2014_legacy	SMP Bitstream access over legacy copper network
	M3b_2014_NGA (including FTTC)	SMP Bitstream access over NGA FTTC network
	M3b_2014_NGA (including FWA)	SMP Bitstream access over NGA Fixed Wireless Access network
	M3b_2014_(FTTH)	SMP Bitstream access over FTTH network
	M3b_2014_(Cable docsis <3.0)	SMP Bitstream access over cable docsis <3.0
	M3b_2014_(Cable docsis >3.0)	SMP Bitstream access over cable docsis >3.0
Market 4	M4_2014_Active_Legacy	SMP Terminating segment over copper network
	M4_2014_Active_NGA (native Ethernet)	SMP Terminating segment over NGA network
	M4_2014_Passive	SMP Access to passive infrastructure

Source: BEREC RA Database 2021

## 2.4 The symmetric regulation

The symmetric framework has been introduced by art. 12 of the Framework Directive, as modified by Directive 2009/140/CE.

The EECC gives more emphasis to symmetric regulation in art 61 and introduces new powers for NRAs in 61(3)<sup>7</sup>. Symmetric regulation is considered in some way logically upstream to the SMP regulation. This is why it is presented before the SMP approach in the present report.

Up to now there is no direct application of art. 61 of the EECC, but a “legacy” symmetric framework is present in the regulation of several member states. Specifically, different information on sub-paragraph 1 (access to wiring and cables and associated facilities inside buildings) and sub paragraph 2 (access point beyond the first concentration point) has been collected.

Symmetric regulation affecting the terminating segment is applied by 7 NRAs (ES, FR, HR, HU, IT, LV, PT), thus granting access to wiring and cables and associated facilities inside buildings or up to the first concentration or distribution point as determined by the national regulatory authority.

Access obligation beyond the first concentration point (which would correspond to art. 61 paragraph 3 sub-paragraph 2) has been declared by 3 NRAs (FR, HR, HU).

The symmetric obligation has been considered a complement of the SMP regulation on terminating segment for HU and IT; in that case all sets of other remedies have been imposed on an SMP basis, also including the obligation to publish a reference offer for accessing the terminating segment.

A symmetric access obligation in line with sub paragraph 2 has been considered a complement with respect to Fibre ULL (FULL) and/or VULA FTTH by two NRAs (HR, HU) of the three that already apply the symmetric obligation in line with this provision of the sub paragraph 2 of art. 61 (3) of EECC.

In France, the choice of a symmetric regulation with passive access obligation at the shared access point has been applied since 2009 as the main regulatory instrument for NGA networks. The main objective has been to allow fair and effective competition, and to promote investment by the multiplicity of actors wanting to invest in the new FTTH infrastructure. This symmetric regulation works together with a SMP regulation of the access to civil engineering. It includes provisions that facilitate co-investment between operators. In the case of France, the application of the symmetric obligation has been considered sufficient enough to generally not impose SMP remedies on fibre in market 3a for the mass market.<sup>8</sup>

## **2.5 The SMP remedies framework**

In this section an overview of the SMP finding at single product level is given. The NRAs were asked to provide information on the identifying one or more SMP operator(s) with respect to the corresponding product/market on the legal basis of art. 63 of the EECC. When an SMP position is identified the NRAs may impose obligations on the SMP operator(s) on the basis of the ex ante (asymmetric) market review process that is provided under EU legislation (art. 68 of EECC).

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<sup>7</sup> Art. 61 (3) subparagraph 1 EECC states that: “national regulatory authorities may impose obligations, upon reasonable request, to grant access to wiring and cables and associated facilities inside buildings or up to the first concentration or distribution point as determined by the national regulatory authority, where that point is located outside the building”. The NRA “national regulatory authority... it may extend the imposition of such access obligations, on fair and reasonable terms and conditions, beyond the first concentration or distribution point, to a point that it determines to be the closest to end-users, capable of hosting a sufficient number of end-user connections to be commercially viable for efficient access seekers.”

<sup>8</sup> However, concerning FR, even if no SMP regulation has been imposed for fibre LLU, the SMP operator - since the 2017 market analysis decision – is regulated on a part of the fibre local loop, in two specific cases : (i) offers for business customers; (ii) offers with enhanced quality of service.

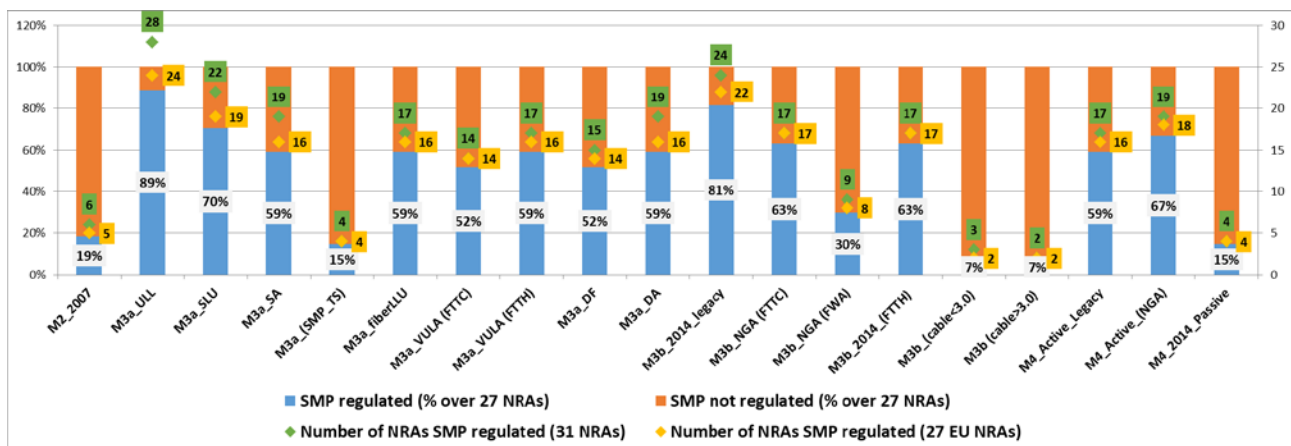


## General remedy application

In Figure 3 the updated situation in terms of remedies applied to SMP operators at single product level is shown. The absolute number of NRAs that apply SMP regulation for the corresponding product/market is provided, considering i) all NRAs (EU and non-EU: 31 NRAs) and ii) only EU NRAs (27 NRAs) that have provided information. The regulation of legacy products in market 3a and 3b is more frequent: 90% of EU NRAs still maintain SMP remedies on ULL and 81% on market 3b legacy copper network (the same as in the last year's report). In case of FTTC the situation in market 3a (VULA) and market 3b is substantially unchanged. In case of FTTH there is an increase in the number of NRAs that apply regulation both in market 3a and 3b for FLLU (IE) and Bitstream (AT). In relation to duct access the obligation has been added by EL since last year's report.

The situation shows a clear reduction of SMP positions in market 2/2007 (origination market), with respect to the previous year; only 5 EU NRAs currently have an SMP regulation in comparison to 8 in 2020 and 9 in 2019 (over 27 EU NRAs).<sup>9</sup> Two NRAs do not apply any SMP or Symmetric regulation (BG and RO) in the analysed products and markets at national level due to the fact that all markets have been found to be competitive.<sup>10</sup>

Figure 3 - SMP-regulatory situation



Source: BEREC RA Database 2021

Considering NGA and VHCN (FTTH), SMP regulation in market 3a and/or 3b has been applied by almost all NRAs that have provided information; 24 NRAs of 31 have applied SMP regulation to FTTC and/or FTTH (not including duct access, where SMP has been applied by 19 NRAs): AT, BE, CY, CZ, DE, DK, EE, EL, ES, FI, FR, HR, HU, IE, IT, LT, LU, LV, MT, NO, PL, SE, SI, SK, LI and ME have applied SMP regulation only to the legacy copper network, PT and RS have applied SMP regulation to the legacy copper network in combination with duct access. With respect to NGA 11 NRAs have applied regulation in markets 3a and 3b on both FTTC and FTTH (AT, BE, CZ, FI, HR,

<sup>9</sup> EL and PL removed the regulation on the origination market since last year. In FR a new market analysis process is currently ongoing.

<sup>10</sup> NL does not apply any regulation to access markets due to the fact that the Dutch court annulled the national regulator's decision concerning Joint Dominance and thus the obligation for joint dominance network access.

HU, IE, IT, LV, SI, SK), signifying an increase since last year;<sup>11</sup> 4 NRAs have applied regulation only to market 3a VHCN (FLLU and/or VULA FTTH) (FR, MT, NO, SE); in such cases no regulation has been applied to the FTTC network.

Where no FTTC deployment is present, regulation in market 3b is less frequent. Market 3b is always regulated where market 3a products are available, as expected.<sup>12</sup> Moreover, all the 24 NRAs previously mentioned have applied SMP regulation including at least one VHCN-FTTC product (market 3a/3b), in line with the fact that this technology is becoming the most relevant in the context of the EU digital strategy. VHCN, regulation has been applied to market 3a VULA FTTH by 17 NRAs (AT, BE, CY, CZ, EL, ES, FI, HR, HU, IE, IT, LU, LV, MT, NO, SI, SK) and FLLU by 7 (DE, DK, EE, FR, LT, PL, SE)<sup>13</sup>. Where VULA-FTTH is present, regulation in market 3b VHCN is also more frequent. Regulated VULA FTTH is present in 13 of 17 NRAs (76%), here market 3b FTTH has been regulated (AT, BE, CZ, ES, FI, HR, HU, IE, IT, LU, LV, SI, SK).

In comparison to last year's report the regulation of NGA products is increased. In Figure 4 the whole set of regulated products by the 31 NRAs, ranked by the number of regulatory obligations in market 3a and 3b, is shown. NRAs have been ranked taking into account the following scale of product remedies: i) ULL; ii) VULA\_FTTC; iii) VULA FTTH; iv) FLLU; v) M3b legacy network; vi) M3b FTTC; vii) M3b FTTH; viii) M3a\_duct access; ix) M3b cable.

The graph provides a classification of the considered regulatory measures. The following access remedies have been considered for market 3a: LLU; VULA FTTC; VULA FTTH; Fibre LLU. For market 3b: legacy, NGA (FTTC) and FTTH have been considered. Duct access and Market 3b cable (Docsis >3.0) have also been included. Since last year's report few NRAs have changed their approach (BE, IE, SI, AT, LT, LI); BE and IE have also included FLLU in their set of SMP remedies; AT and SI have included remedies in market 3b FTTC and FTTH; LT has removed obligations in market 3a and 3b FTTC (VULA and bitstream); LI has removed FLLU obligations.<sup>14</sup>

<sup>11</sup> AT and SI have included in their SMP framework regulation of market 3b FTTC and FTTH whereas LT has removed only regulation of market 3b FTTC.

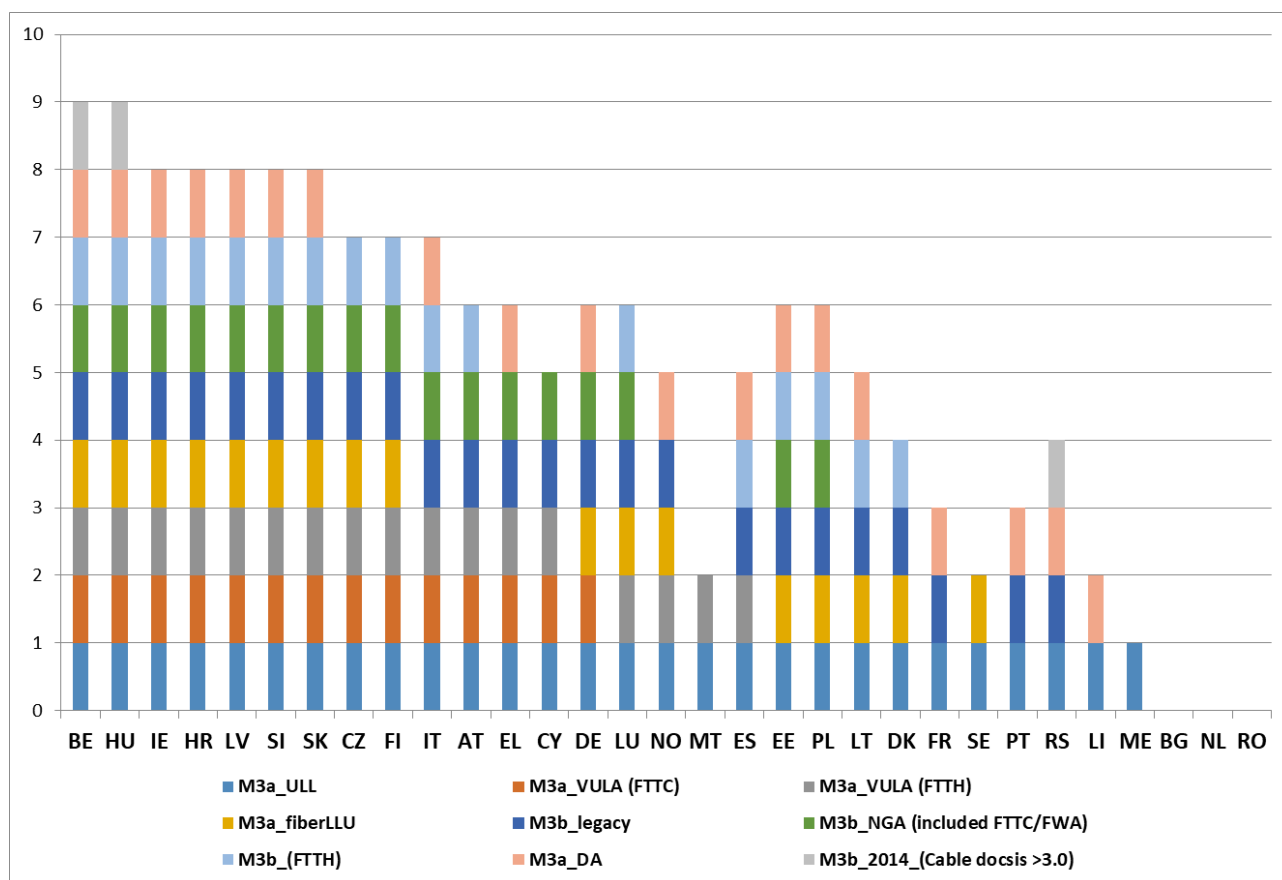
<sup>12</sup> EE: VULA over FTTC and FTTH it is in principle regulated, but no demand is present for that product contrary to market 3b.

<sup>13</sup> 10 NRAs apply both FLLU and VULA over FTTH (BE, CZ, FI, HR, HU, LU, LV, NO, SI, SK).

<sup>14</sup> In relation to other remedies Dark Fibre in market 3a has been included by two more NRAs since last year: EL and SI, SLU has been added by HR and duct access has been included by EL and removed by LT.



Figure 4 - SMP-regulatory situation (remedies applied)



Source: BEREC RA Database 2021

A first group of countries has applied all access obligations for all products (5 in NGA: VULA FTTC, VULA FTTH, FULL, M3b\_NGA, M3b\_FTTH; 2 legacy: ULL and M3b\_legacy - while information on cable and ducts varies) in market 3a and 3b (BE, HU, IE, HR, LV, SI, SK, CZ, FI) apply regulation in FTTH (FULL or VULA)<sup>15</sup>.

In a second group of countries, FTTC is regulated and four out of five main regulatory obligations on NGA are in charge in market 3a and 3b (IT, AT, EL, CY, DE). In this case VULA FTTH or FLLU are applied alternatively as main obligations for VHCN.

A third group of countries (LU, NO, MT, ES, EE, PL, LT, DK, FR, SE) sees FTTH and not FTTC as the main deployed architecture for NGA, but the relevance of copper network has prevented the lift up of the regulation on copper. In such cases VULA FTTH or FLLU are the instruments for SMP regulation, sometimes in combination with remedies in market 3b.

Other countries (PT<sup>16</sup>, RS, LI) have included only duct access as an instrument for regulatory purposes to NGA networks. BG, NL and RO do not impose remedies in market 3a and market 3b.

Summing up, the first two groups include NRAs that regulate copper, NGA over FTTC and FTTH, in market 3a/3b in general (the second group applies lighter FTTH regulation). The third group includes NRAs that regulate copper and FTTH not only via duct access; the 4th group does not apply SMP

<sup>15</sup> CZ and FI do not regulate access to ducts.

<sup>16</sup> PT applies symmetric obligation to civil infrastructure independently of the BCRD provision.

regulation or it regulates copper and applies FTTH regulation only based on civil infrastructure access.

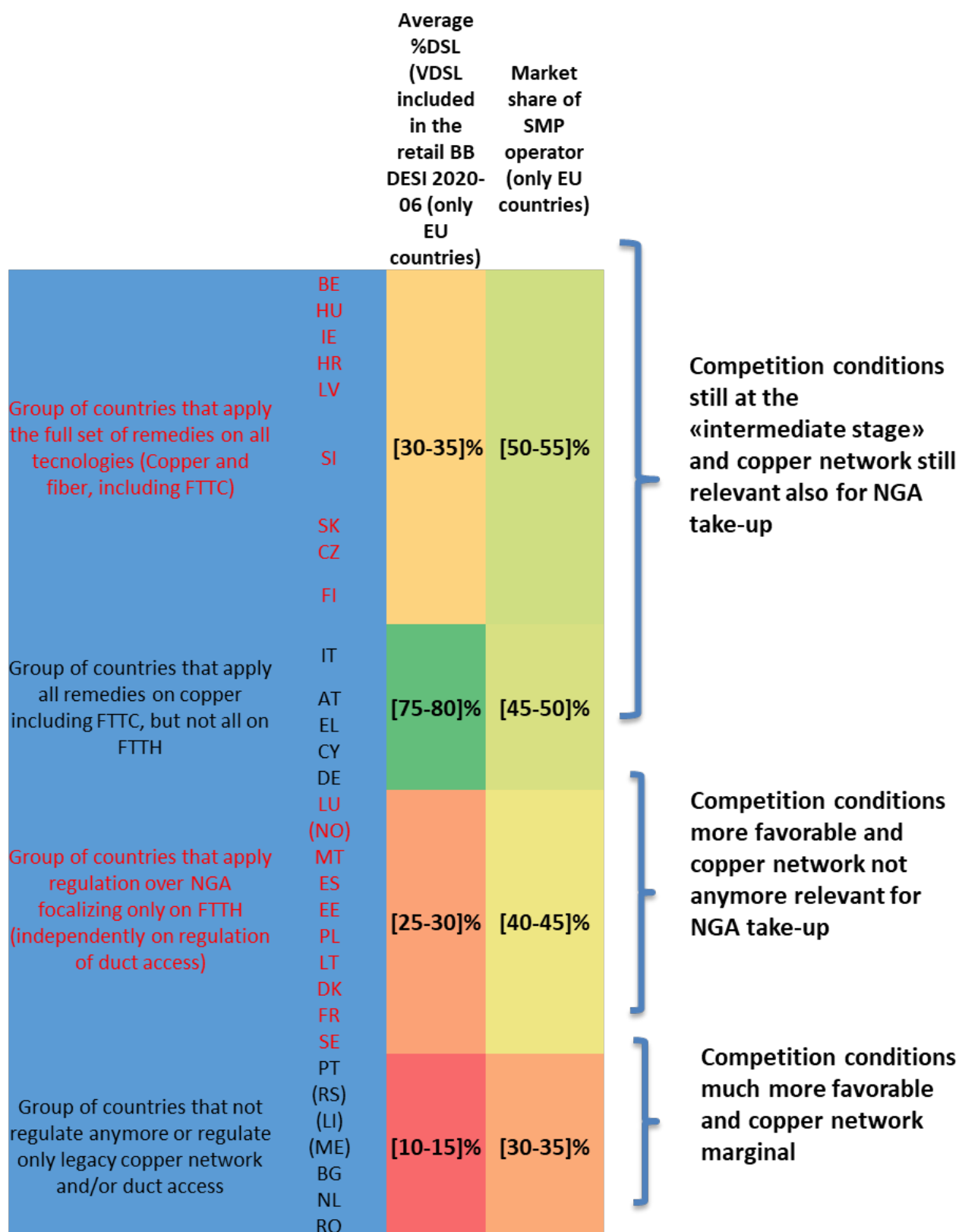
In the light of the four identified groups of NRAs, two main indicators are considered in figure 5: i) the weight of DSL over retail BB market share (DESI Report, latest available data),<sup>17</sup> in order to understand the relevance of the legacy copper network for each country (including VDSL); ii) the SMP retail market share, which has been provided in the RA database 2021.

The average values have been calculated including only EU countries (in the picture non-EU countries (NO-LI-ME-RS) have been reported in brackets and not included in the calculation of averages), since the DESI Report figures are only available for these countries. The first group combine a high FTTH/cable coverage (less relevant is the FTTC intermediate stage) in combination with an SMP market share of > 50%, on average. The second group regulates FTTC, however the copper network is more relevant for NGA deployment and where the competitive situation (SMP market share) is at an intermediate stage. This is the case for a specific group of countries (IT, AT, EL, CY, DE).<sup>18</sup> In the third and fourth group the copper network is less relevant and the transition to FTTH/VHCN, on average, is – like the competitive situation - at a more advanced stage.

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<sup>17</sup> <https://digital-strategy.ec.europa.eu/en/policies/desi>.

<sup>18</sup> For confidentiality reasons, the averages of SMP market shares and other indicator are given in a range.

Figure 5 - SMP-regulatory approach vs network evolution and SMP market share.<sup>19</sup>

Source: BEREC RA Database 2021

<sup>19</sup> NL does not apply any regulation in access markets due to the fact that the Dutch court annulled the national regulator's decision concerning on Joint Dominance and thus the obligation for joint dominance network access.

The SMP regulatory remedies generally apply to a single SMP operator that is national in scope. In some cases (BE, HU, IE and FI) the SMP regulation has been applied to more than one SMP operator. HU consider 3 SMP operators in market 3a and 3b for all technologies; FI consider >4 SMP operators in market 3a, 3b and 4; BE consider 3 SMP operators in case of bitstream over cable network.

Where more than one SMP operator is present they mostly operate in the same geographical area, but use their own infrastructure (FI and HU). In HU the network of SMP operators have an overlapping coverage, but there is only one SMP operator per geographically separated area. In BE the cable operators, designated SMP in market 3b, operate in different geographical areas over cable network.

In all the cases where more than one SMP operator has been designated to be SMP in access markets, the motivation for regulation is not based on the legal basis of Joint Dominance in the context of Art. 63 paragraph 2. of EECC.<sup>20</sup>

The following section includes more detailed information on the geographical scope of the regulation which provides a better description of the regulatory context.

### Geographical regulation

A differentiated geographical approach to regulation reflects the level of competition reached in each part of the country; it provides insight into the impact of the SMP regulation where a market has been partially deregulated.

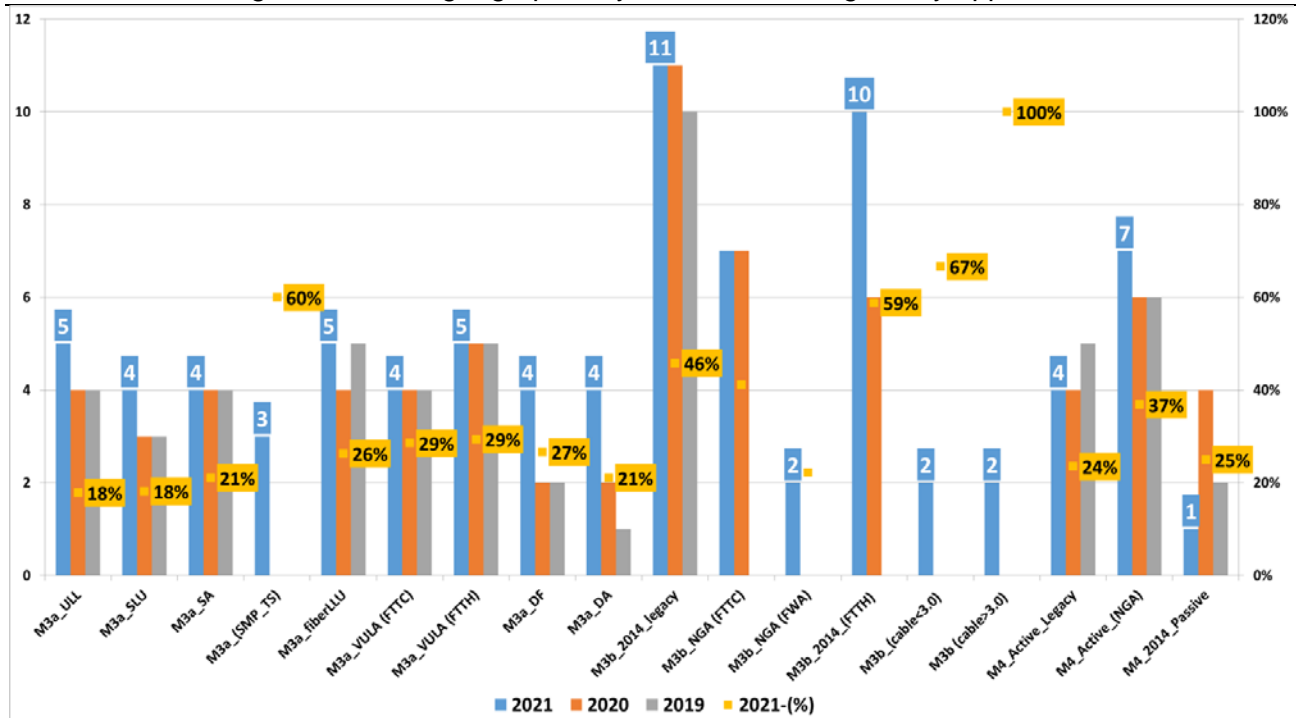
In Figure 6 the number and the corresponding percentage of NRAs that have applied some form of geographically differentiated approach is provided for each market and product for 2021 and previous years. The number of NRAs that have identified different competitive conditions across the national territory justifying a geographically differentiated approach (in terms of market definition or remedies application) has increased in comparison to last year for most markets/products. An increase is seen in particular in market 3b, where the number of NRAs that apply geographical regulation has increased, reaching about 50% of NRAs regulating the product/market for the legacy network and about 60% of NRAs regulating market 3b FTTH. This is also the case for market 4 NGA (Ethernet). With respect to last year an increased trend is also seen for products in market 3a.<sup>21</sup>

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<sup>20</sup> The application of Joint Dominance (JD), as considered in comparable way of provision of art. 63 paragraph 2, has been applied only by ACM, NL in their last market review in September 2018. This analysis has been annulled by the Dutch Trade and Industry Appeals Tribunal, which found that the theory of JD would not be easy to prove, even when using economic models, due to the fact that these models must take into account the specific characteristics of the relevant undertakings and markets concerned as far as possible. Moreover, according to the Tribunal, the modified greenfield approach in the SMP assessment phase, applied by ACM, should have taken into account the incentives and possibilities of commercial agreements between undertakings even in the absence of regulation.

<sup>21</sup> The 2020 and 2019 replies are homogenous with the ones in 2021, considering only replies of the 31 NRAs that have provided information for the 2021 RA report. In market 3b the distinction between FTTC and FTTH was not available in 2019. For the cable product the information is available only for 2021.

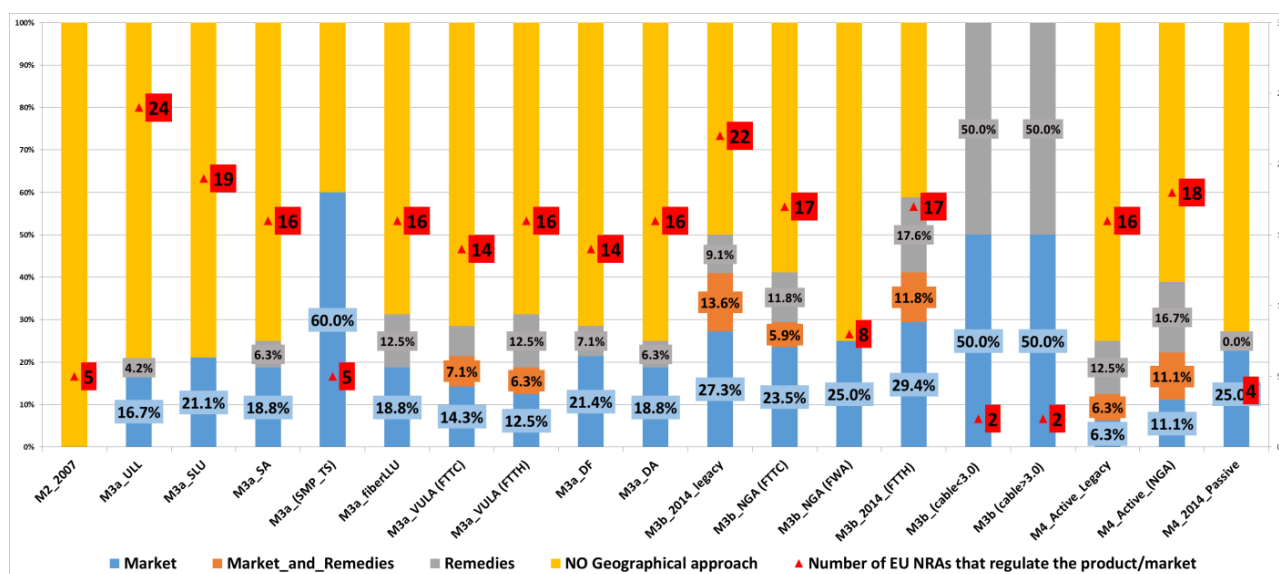
Figure 6 - SMP- geographically differentiated regulatory approach



Source: BEREC RA Database 2021

In Figure 7 the percentage of EU NRAs (27 NRAs) that apply geographical regulation is given for 2021 for those NRAs that regulate the market in question; in the illustration the percentage is provided: i) market; ii) market and remedies; iii) remedies. “Market” means that NRAs apply a differentiated approach in different geographical markets: in that case there is generally a geographical area where regulation is lifted-up and a second geographical area where remedies are applied due to SMP findings (or alternatively, different geographical markets are identified for different SMP operators); “Market and remedies” means that NRAs apply, in a differentiated geographical market approach, differentiated remedies; “Remedies” means that there is one national geographical market, but remedies are differentiated.

Figure 7 - SMP - geographically differentiated regulatory approach



Source: BEREC RA Database 2021

NRAs that apply a differentiated approach to regulation are reported in Figure 8. In the table the percentage of households/population falling under geographical regulation is shown. For each product/market the percentage of deregulated areas (market regulation) and the competitive areas (remedies differentiation) is provided. The reported percentage of competitive areas have to be considered in addition to the deregulated areas.<sup>22</sup>

The same picture shows that deregulated areas range from <5% of households up to <60% in market 3b, very often between 5 and 20%.<sup>23</sup> The percentage of households/population falling under a geographical regulation in combination with less regulatory obligations in markets 3a and 3b (ES, PL, PT, FR) is in line with a regulatory path where a geographical regulation is applied to avoid non-proportional regulation (the range of countries in Figure 9 follows the one reported in Figure 5).

<sup>22</sup> A missing value in the table means that there is no regulated product/market. For FR the geographical approach has been reported in the category FLLU even if it refers to the symmetric approach as described in the previous paragraph. For FI the % is an estimation based on public information available on FI/2018/2052-2053. For IT in market 3a, the possibility to apply different remedies in “competitive areas” is conditioned to a specific level of retail take-up over FTTH network at national level. For IE a precise % of households is not available for every case from the public source IE/2018/2089. The geographical urban WCA market, has been deregulated; it constitutes 145 CO to 1058 (roughly 20% of the whole number of CO). Market 4 (IE/2019/2214) WPZ areas 1 and 3 have been deregulated corresponding to 2773 WZP areas to 7219 WZP areas (roughly 40% of the total number of WZP areas).

<sup>23</sup> PT apply a differentiated market and remedies approach in ex market 4\_2014; as this is a market targeted to companies (small, medium and large) the percentage of households covered (by regulated and/or deregulated areas) is not relevant.

Figure 8 - Households in deregulated/competitive areas<sup>24</sup>

	FLLU		VULA FTTH		Market 3b FTTH		VULA FTTC		Market 3b FTTC		ULL		Market 3b legacy		M4 NGA		Duct access	
	Deregulated areas (Market regulation)	Competitive areas (remedies differentiation)	Deregulated areas (Market regulation)	Competitive areas (remedies differentiation)	Deregulated areas (Market regulation)	Competitive areas (remedies differentiation)	Deregulated areas (Market regulation)	Competitive areas (remedies differentiation)	Deregulated areas (Market regulation)	Competitive areas (remedies differentiation)	Deregulated areas (Market regulation)	Competitive areas (remedies differentiation)	Deregulated areas (Market regulation)	Competitive areas (remedies differentiation)	Deregulated areas (Market regulation)	Competitive areas (remedies differentiation)	Deregulated areas (Market regulation)	Competitive areas (remedies differentiation)
BE	0	<5%	0	<5%	0	<5%	0	<5%	0	<5%	0	<5%	0	<5%	0	NA	0	<5%
HU	<20%	0	<20%	0	<20%	0	<20%	0	<20%	0	<20%	0	<20%	0	0	0	<20%	0
IE	0	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	0	0
SI	0	0	0	0	0	<40%	0	0	0	<40%	0	0	0	<40%	0	0	0	0
CZ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FI	<5%	0	<5%	0	<5%	0	<5%	0	<5%	0	<5%	0	<5%	0	<5%	0		
IT			<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	0	<5%	<5%	<5%	<5%	<5%	0
AT			0	0	0	0	0	0	0	0	0	0	0	0	<50%	0		
DE	0	0					0	0	0	0	0	0	0	0	0	0	0	0
ES			0	<40%	<60%	0				0	0	<60%	0	0	0	0	0	0
PL	<20%	0			<40%	0			<40%	0	<20%	0	<40%	0			<20%	0
LT	0	0			<5%	0				0	0	<5%	0	0	0	0	0	0
DK	0	<10%			0	<10%				0	0	0	0	0				
FR	0	<20%								0	0	<20%	<90%	0	<30%	0	0	0
PT										0	0	<60%	0	Not relevant	Not relevant	0	0	0

Source: BEREC RA Database 2021

Where different geographical markets are identified, two areas have generally been specified: one which is not regulated and another where SMP is identified. The same applies to geographical remedies (one competitive area and one non-competitive area). More than two geographically differentiated areas have been identified by four NRAs as reported in the following table.

Figure 9 - More than two geographical areas (market or remedies)

Country	Numbers of markets/Remedy areas	Market/product	Notes
FI	>4_markets	For all markets/product with geographical differentiation	Market 3a and 3b contains 150 relevant geographic wholesale markets. Remedies have been differentiated by SMP operator (3 large operator have stricter remedies than 18 small operators), not geographically. Competitive areas have been completely deregulated.
HU	>4_markets	For all markets/product with geographical differentiation	3 regulated and 3 deregulated markets (as country were divided into 3 incumbent operators' areas, therefore 3 times 2 [regulated-non regulated] markets are present)
AT	3_markets	Market 4	
FR	3_remedy_areas	Market 4	

Source: BEREC RA Database 2021

### Single remedies application.

In this section an overview on the application of the set of remedies imposed for each product ( Ex Art. 69-74 of the EECC) is given in non-competitive areas in case remedies differentiation is in charge or a national market is defined. The specific cross reference to the Access Directive has been made in continuity with the previous reports and it has taken into account that the European Electronic Communications Code (EECC) is still in the transposition phase in several EU Member States.

<sup>24</sup> Some countries: have also reported that for FTTH there is a state aid plan: HU (<30% of premises), SI (<10%), CZ (<20%), IT (<30%), DE (<5%), FR (<50%).

In any case, the remedy sets “Transparency”; “Non-discrimination”; “Accounting separation”; “Access”; “Cost accounting” and “Price control” are still available in the EECC.<sup>25</sup>

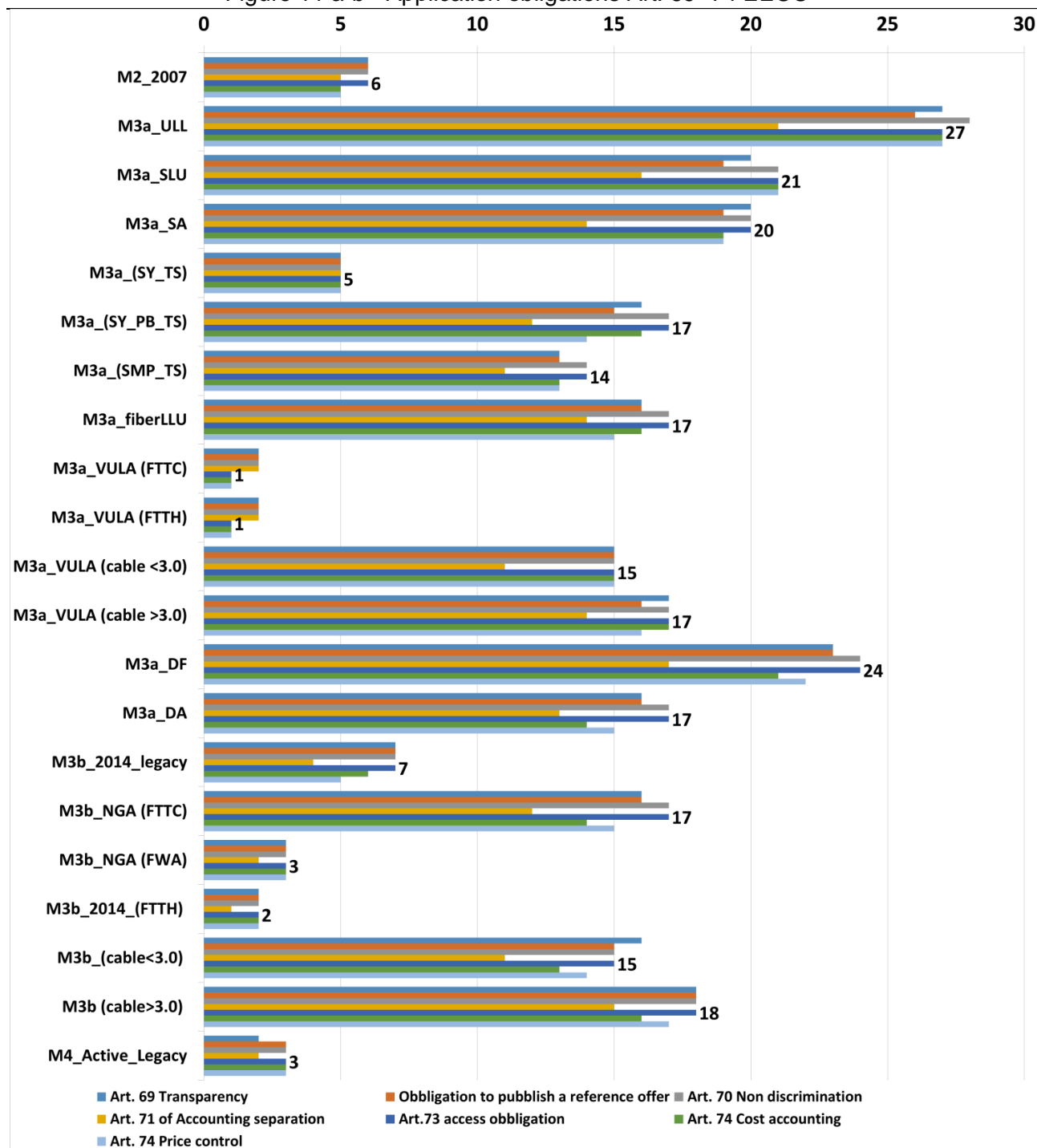
Figure 10 - EECC art. 69-74

Article	Obligation
Art. 69 (Ex. Art. 9)	Transparency
Art. 70 (Ex. Art. 10)	Non-discrimination
Art. 71 (Ex. Art. 11)	Accounting Separation
Art. 72	Access to civil infrastructure
Art. 73 (Ex. Art. 12)	Access to and use of specific network facilities
Art. 74 (Ex. Art. 13)	Cost accounting
Art. 74 (Ex. Art. 13)	Price control

The absolute number of NRAs (including both EU and non EU member states) that have applied a single obligation is reported, as well as the percentage of EU member NRAs (of the 27 EU NRAs) that have applied the set of remedies in the less competitive areas or in the whole national market is also provided.

<sup>25</sup> In relation to the EECC we refer to: Art. 69 (Obligation of transparency), Art. 70 (Obligation of non-discrimination); Art. 71 (Accounting separation); Art. 72 (access to civil infrastructures ) and 3 (Obligation of access to and use of specific network elements and associated facilities); Art. 74 (Price control and cost accounting obligations).



Figure 11 a-b - Application obligations Art. 69 -74 EECC<sup>26</sup>

Source: BEREC RA Database 2021

Figure 11 shows that different sets of remedies have been applied to each product.

Most NRAs apply the whole sets of remedies where SMP regulation is imposed on a specific product/market, where access obligation in combination with non-discrimination are the most frequently applied remedies.

<sup>26</sup> Labels report the indication of relevant markets according to the 2014 Rec.

Within the copper network, ULL is still the most regulated product, while, in general, for each product, Focusing on RA in general, accounting separation is often imposed together with the cost accounting obligation. Some NRAs consider it necessary to impose both obligations in order to ensure that robust regulatory accounting information is available for each product. This rationale is related to the fact that accounting separation is useful for vertically integrated undertakings by using cost models to supplement price control measures in order to prevent unfair cross-subsidies (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. In a quite mature and stable environment, such as LLU services in market 3a, 20 NRAs have applied accounting separation in combination with all other sets of remedies.

Considering the “competitive areas” (Figure 12), where geographical remedies differentiation is applied to some markets/products (BE, IE, SI, IT, ES, FR, DK), the set of remedies that are applied in more competitive areas can be distinguished into three groups of NRAs: i) the price control obligation at least for 3b market has been eliminated, holding all other SMP remedies (SI, IT<sup>27</sup>, FR); ii) only access and transparency obligations/publication of a reference offer have been maintained (BE, IE); iii) all set of remedies in the same geographical market have been completely eliminated (ES, DK).

Figure 12 - Remedies in competitive areas

Country	Kind of obligation in more competitive areas
BE	Only access obligation and transparency obligation
IE	Only access obligation and obligation to publish a reference offer
SI	No price control and cost accounting
IT	No price control
ES	No access obligation in competitive areas and lift up of all set of remedies
DK	No access obligation in competitive areas and lift up of all set of remedies
FR	No price control

Source: BEREC RA Database 2021

For a general perspective of remedies differentiation, we have added to the four groups of countries highlighted in figure 5 indicators on (i) the percentage of cable retail BB lines (ii) the average level of deregulated areas (for copper, FTTC, FTTH),<sup>28</sup> where relevant. As can be seen in figure 13, more regulatory flexibility is granted, also at a geographical level, where the copper network is less relevant for NGA deployment and in case infrastructure competition based on cable network is more relevant.

Figure 13 - Remedies in competitive areas

<sup>27</sup> Only for market 3b.

<sup>28</sup> The average has been evaluated considering “0” where regulation is in charge without combining any geographical approach to regulation in market 3a and/or 3b. In case of geographical differentiation the maximum % of households has been considered in market 3a, 3b as reported in figure 8; “100%” of flexibility where no regulation is present on the corresponding technology both on market 3a and 3b. Only EU countries have been considered when calculating averages.

Countries	Average %DSL retail BB DESI 2020-06 (only EU countries)	Market share of SMP operator (only EU countries)	%cable retail BB (only EU countries)	Copper (Average level of Deregulated areas+Competitive areas) (% of households)	Fiber FTTH (Average level of Deregulated areas+Competitive areas) (% of households)	FTTC (Average level of Deregulated areas+Competitive areas) (% of households)
BE HU IE HR LV SI SK CZ FI	[30-35]%	[50-55]%	[25-30]%	15%	15%	15%
IT AT EL CY DE LU (NO)	[75-80]%	[45-50]%	[15-20]%	3%	3%	3%
MT ES EE PL LT DK FR SE	[25-30]%	[40-45]%	[20-25]%	39%	27%	8%
PT (RS) (LI) (ME) BG NL RO	[10-15]%	[30-35]%	[25-30]%	60%	100%	100%

Competition conditions still at the «intermediate stage» and copper network still relevant also for NGA take-up

Competition conditions more favorable and copper network not anymore relevant for NGA take-up

Competition conditions much more favorable and copper network marginal

Source: BEREC RA Database 2021

### 3. Outline of the Results

#### 3.1 Regulatory Accounting methodologies (definitions)

In this section a focus on the regulatory accounting methodologies is given. When useful, the information about the regulatory accounting methodologies has been integrated using information on other elements which are considered to have a relevant impact on pricing and regulatory accounting. In that context we still refer mainly to the instruments which are provided by the NDCM Recommendation<sup>29</sup> such as: i) the availability of an economic replicability test (ERT); ii) the imposition of a non-discrimination obligations.

<sup>29</sup> From 16 July 2020 until 7 October 2020 the Commission launched a public consultation for the revision on the NGA Recommendation (NGA) and the Non Discrimination and Costing Methodologies Recommendation (NGCM), to which BEREC replied (BoR (20) 169).

With reference to regulatory accounting methodologies, a set of pre-defined options has been used in order to improve data comparability while providing a more detailed picture over the years. Information is related to non-competitive areas or national geographical market.

### Price control

For the price control methodology the following categories and sub categories have been considered (Figure 14 - Price control categories and sub-categories 14).

Figure 14 - Price control categories and sub-categories

Price control Main category	Subcategory 1 Cost orientation	Subcategory 2 Retail minus	Subcategory 3 Benchmarking
Cost_Orientation	Cost orientation alone	Ex - ante retail traditional MS test	Benchmarking in compliance with Recommendation of 11 Sept 2013 (access market)
Retail_minus	Price cap alone	Ex - ante wholesale MS test	Benchmarking in compliance with Recommendation of Termination Rates Recommendation of 7 May 2009
Benchmarking		ERT (Economic Replicability Test)	
Others/Combination		Fair and reasonable pricing	
No price control		Retail minus	

Source: BEREC RA Database 2021

The sub category “price cap” is included in the sub category “cost orientation” as it is generally derived from a cost computation.

For the purpose of this report, the two sub-categories, Economic Replicability Test (ERT) and Margin Squeeze Test (MST) are defined as follows. ERT is a “lighter” test (with respect to MST) providing more price flexibility to the SMP operator (according to the relevant provisions of the Commission NDCM Recommendation to promote competition and enhancing the broadband investment environment 2013/466/EU). The traditional ex ante MST currently applied by NRAs serves mainly as a complementary tool to price control. It defines a strict level of parameters within which NRAs can 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 can be considered anti-competitive.

### Allocation Methodologies

With reference to the cost allocation methodology used for regulatory decisions, the following categories and sub categories have been set (Figure 15).

Figure 15 - 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 RA Database 2021

The LR(A)IC and LRIC categories refer to a modelling approach used for estimating the cost of the services in both cases; FDC refers to the fact that the cost of the services has been determined taking into account the results of the regulatory accounting system of incumbent operators. LR(A)IC and LRIC categories have been differentiated for the inclusion of common and joint costs in the final cost of services. It is expected that if an NRA chooses LR(A)IC or LRIC categories a bottom up or a top down approach are in use.

For a bottom up asset base we refer to the fact that the asset and operative costs included in the service cost calculation are taken from a theoretical network model. In a top down approach the asset and/or operating cost information is taken directly from the incumbent operator's cost accounting data, thus incorporating the level of (in)efficiency of the incumbent operator in providing the services<sup>30</sup>.

Differences between FDC and LR(A)IC or LRIC are mainly related to the fact that in the first case the prices are determined as a result of the incumbent operator efficiency, eventually using some adjustments prescribed by the NRAs, while in the other cases a modelling approach is used by the NRAs to address the service calculation using as prevalent methodology an allocation method not fully dependent on the SMP case.

#### Cost base

For the used cost base, the traditional categories of HCA and CCA have been identified (Figure 16).

Figure 16 - Cost base categories and sub categories

Cost base
HCA
CCA

Source: BEREC RA Database 2021

### **3.2 Price control methods**

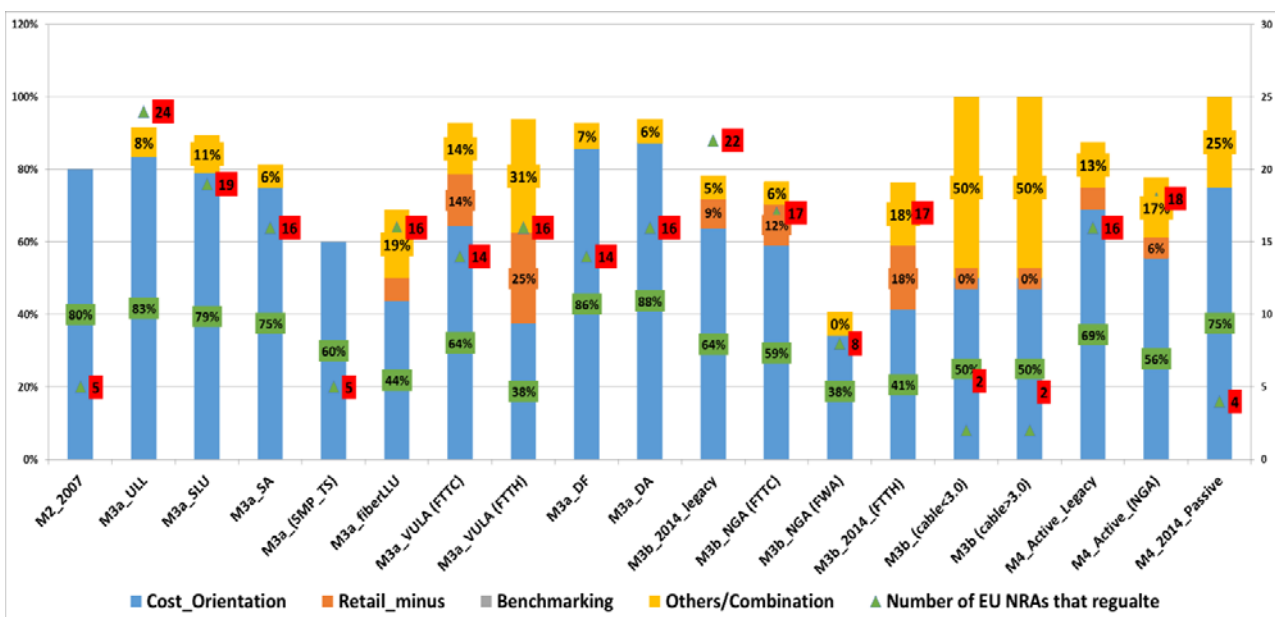
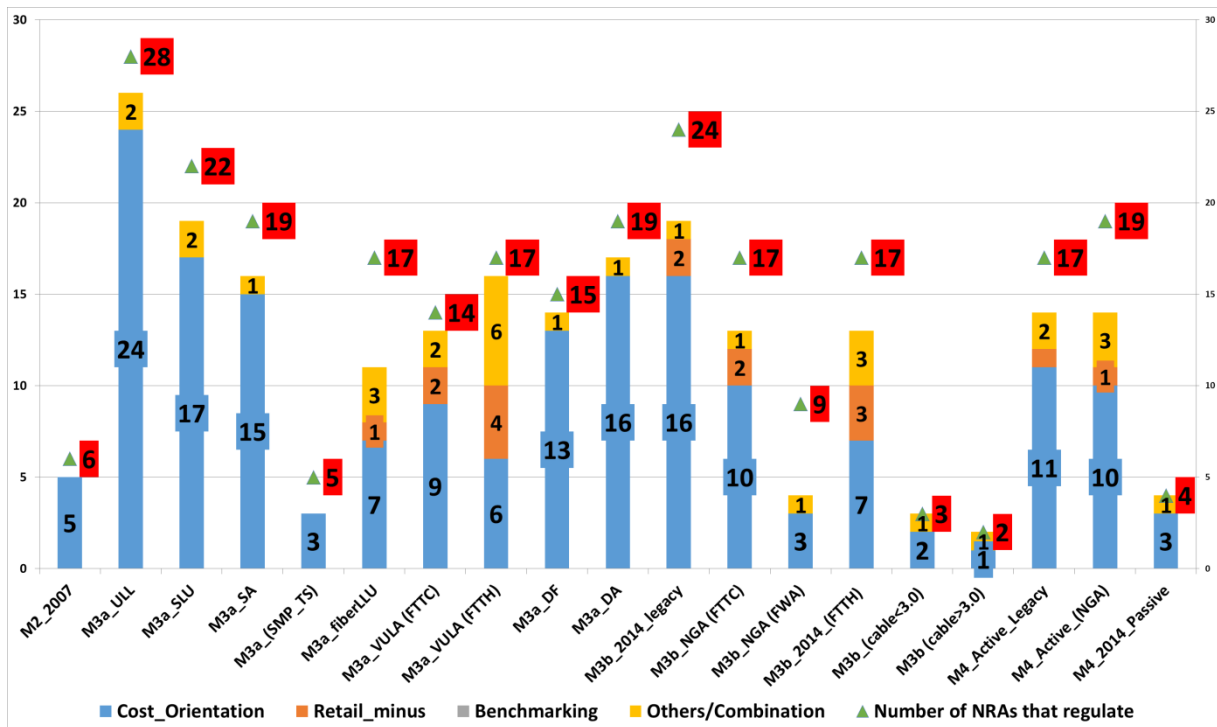
This section gives an overview of the price control methods used by NRAs in 2021 to regulate markets and products according to the main categories and sub categories, which have been previously

<sup>30</sup> The replies to the questionnaire refer to the "main" allocation methodology in use for each product market, even if the whole approach for service calculation can be a mix of methodologies that can refer to more than one category or sub category in the final decision.

reported . In the same picture the corresponding percentage of the main category of price control in use in relation to the number of NRAs that regulate the market is given for EU countries alone.<sup>31</sup>

In terms of main categories of price control, cost orientation remains the most frequently used method, and it has been applied mainly to legacy products (Figure 17). Retail minus is sometimes applied to VULA FTTH products or in market 3b. Looking at EU NRAs 25% of NRAs that regulate VULA FTTH use ERT whereas 38% of the 16 NRAs that regulate the corresponding product use cost orientation.

Figure 17 - Price control main categories

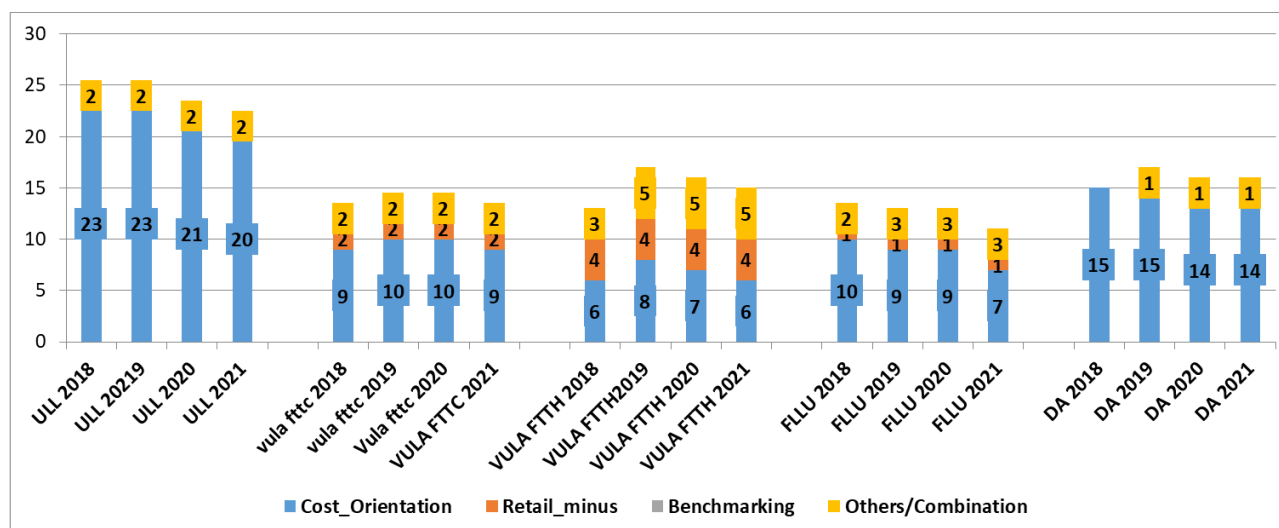


<sup>31</sup> When the percentage shown is lower than 100% for the corresponding product, this is due to the fact that no information is given on regulation or on price control .

Source: BEREC RA Database 2021

In figure 18 the time series for EU NRAs have been considered along the last four years from 2018 (as reported in previous RA reports).<sup>32</sup>

Figure 18 - Price control main categories time series



Source: BEREC RA Database 2021

The recorded changes in the last four years are summarised as follows: the change of pricing approach happens in very few cases in market 3a and changes are mainly due to the deregulation of some products (NL, BG, LT, MT, SE) or due to the fact that the regulatory period is no longer relevant and so a price control obligation, as a general remedy, even if imposed, has not been implemented for some products (EE)<sup>33</sup>. In five cases the obligation of price control has been implemented in the last 3 years (BE, EL, FI, NL, PL) as reported in the following table for each main product in market 3a.

Figure 19 - Price control main categories time series (market 3a)

Product	2021	2020	2019
ULL	EE (no more cost orientation)	NL-BG (no more regulation)	-
VULA FTTC	LT (No more regulation)	NL (no more regulation)	BE (started to be regulated CO), FI (started to be regulated Other/combination)
VULA FTTH	LT (No more regulation)	NL (no more regulation from CO)	BE-FI (started to be regulated Other/combination), NL (started to be regulated CO), HR (started to be regulated CO)
FLLU	MT (no more regulation from CO)		BE (started to be regulated Other/combination), NL (no more regulation from CO)
DA	EE (no more cost orientation), EL (started to be regulated CO)	PL (started to be regulated CO), SE (no more regulation)	BE (started to be regulated Other/combination), HR (started to be regulated)

<sup>32</sup> Only EU NRAs have been considered .

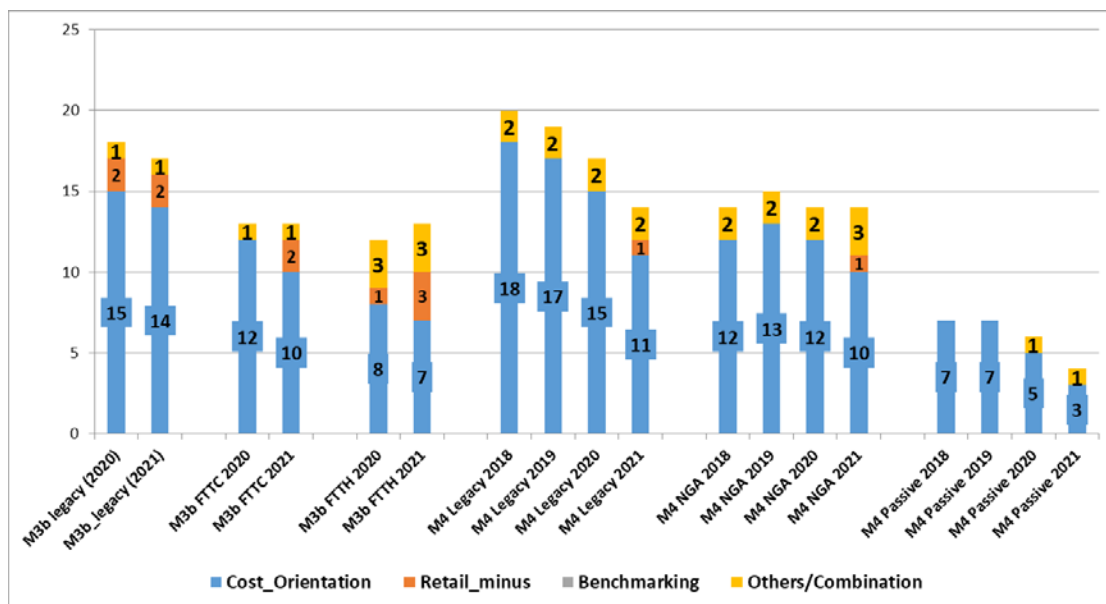
<sup>33</sup> Price control obligation is imposed for the corresponding product, as a general remedy, but no specific implementation has been applied due to the fact that it is not relevant for the market.

			CO), LU (no more regulation from CO)
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Source: BEREC RA Database 2021

Considering the products in market 3b and 4 in Figure 20 the following trend can be observed for the corresponding countries that have modified the declaration along the years. A reduction of regulatory obligation for market 3b over legacy network and an increase of NRAs that have started to implement an FTTH price control, specifically with a Retail Minus approach (AT-SI). A clear reduction of price control obligation is seen in market 4 legacy network.

Figure 20 - Price control main categories time series (market 3b and 4)





Product	2021	2020	2019
MK3b legacy	EE (no more cost orientation)	NA	NA
MK3b FTTC	AT-SI (started to be regulated RM); EE (no more cost orientation); LT (no more regulation from CO)	NA	NA
MK3b FTTH	AT-SI (started to be regulated RM); EE (no more cost orientation)	NA	NA
M4 legacy	AT-HU-IT (no more regulation from CO) EL (Cost orientation RM) FR (from “others” to CO); SI (from CO to “others”)	LV (no more regulation from CO)	PL (no more regulation from CO)
M4 NGA	EL (from CO to RM); SI (from CO to “others”)	LV (no more regulation from CO)	HU-PT (started to be regulated CO); PL (no more regulation from CO)

Source: BEREC RA Database 2021

Looking at the four groups of NRAs previously described in figure 5 the NRAs have been ranked by the remedy set imposed: from a full range (of all products remedies) in market 3a and 3b to complete deregulation. Cost orientation is more frequent where a legacy network based on copper is also relevant for NGA products (FTTC). This corresponds with a stronger interrelation between prices for old and new technology, since there is a stronger substitution effect with respect to the legacy copper product.

In that case, the application of cost orientation for FTTH products has the objective to prevent anti-competitive behaviour and discrimination of end-users and competitors as a result of the SMPs pricing strategy; it rather provides a neutral make or buy signal to encourage investment by all operators in new FTTH networks. In the absence of this intermediate step, the “wait and see” option is less relevant for the SMP operator, because no intermediate steps like FTTC for VHCN transition are present. In such cases it seems to be more popular to apply more flexible for FTTH regulation, also through the use of ERT. This can be seen when analysing the replies on main categories of price control of the four groups of NRAs for copper ULL, VULA –FTTC and FLLU /VULA over FTTH.<sup>34</sup> The illustration shows that cost orientation (also for FTTH) is more frequent in countries in the first two groups, specifically where FTTC (or the copper network) is still relevant for NGA deployment.

<sup>34</sup> The averages exclude non EU countries.

Figure 21 - Relation of price control main categories and general group of NRAs

	ULL			VULA FTTC			FLLU/VULA		
	Cost_Orientation	Retail_minus	Others/Combination	Cost_Orientation	Retail_minus	Others/Combination	Cost_Orientation	Retail_minus	Others/Combination
BE									
HU									
IE	77.78%	0.00%	11.11%	55.56%	11.11%	22.22%	44.44%	11.11%	44.44%
HR									
LV									
SI									
SK									
CZ									
FI									
IT									
AT									
EL	80.00%	0.00%	20.00%	80.00%	20.00%	0.00%	60.00%	20.00%	0.00%
CY									
DE									
LU									
(NO)									
MT									
ES									
EE	88.89%	0.00%	0.00%	0.00%	0.00%	0.00%	33.33%	22.22%	11.11%
PL									
LT									
DK									
FR									
SE									
PT									
(RS)									
(LI)									
(ME)	25%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
BG									
NL									
RO									

Competition conditions still at the «intermediate stage» and copper network still relevant also for NGA take-up

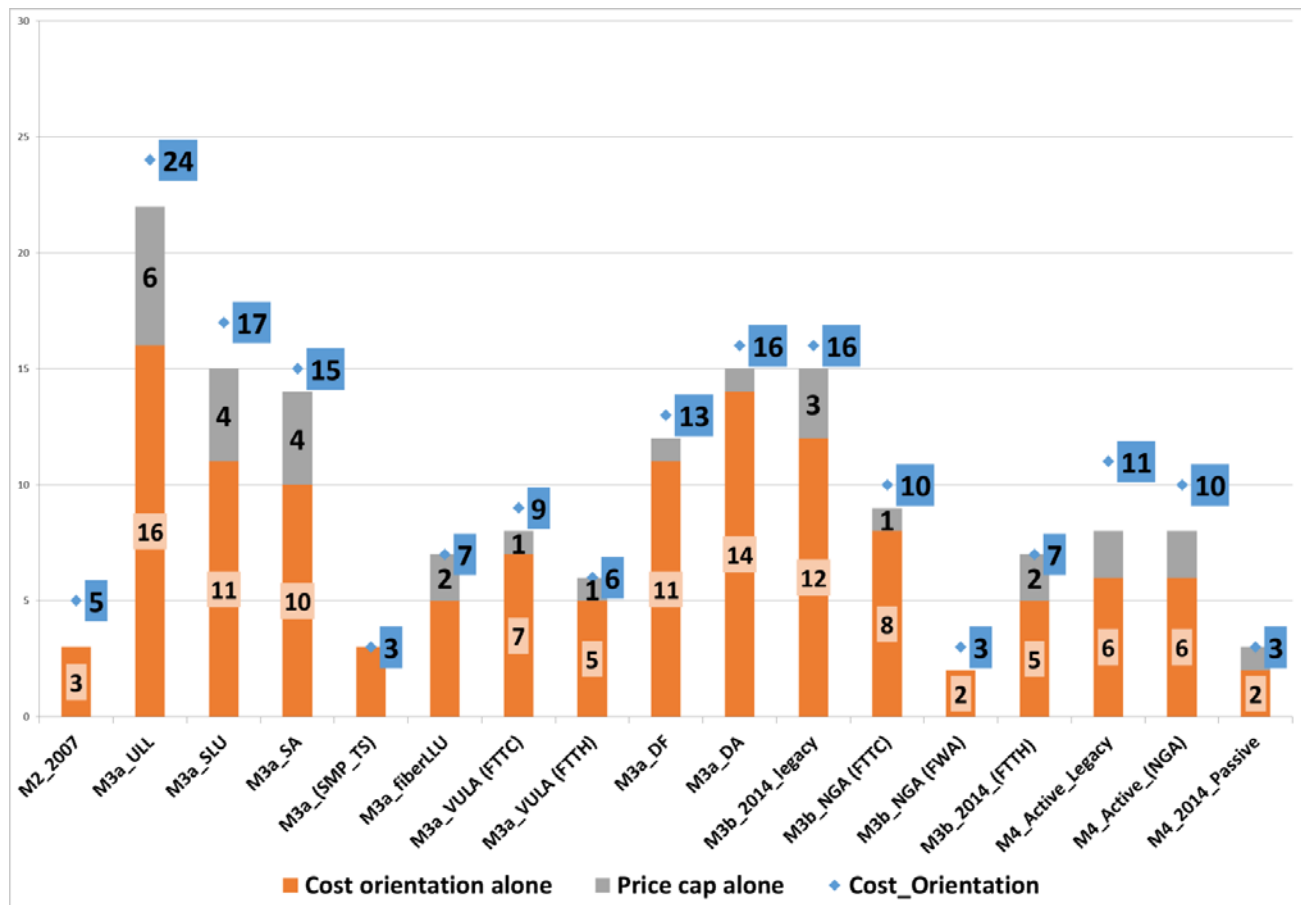
Competition conditions more favorable and copper network not anymore relevant/less relevant for NGA take-up

Competition conditions much more favorable and copper network marginal

Source: BEREC RA Database 2021

With respect to the sub-categories, Figure 22 highlights that cost orientation alone is still the most frequent price control method used by NRAs, especially in case of DA or DF and the corresponding legacy network including market 3b.

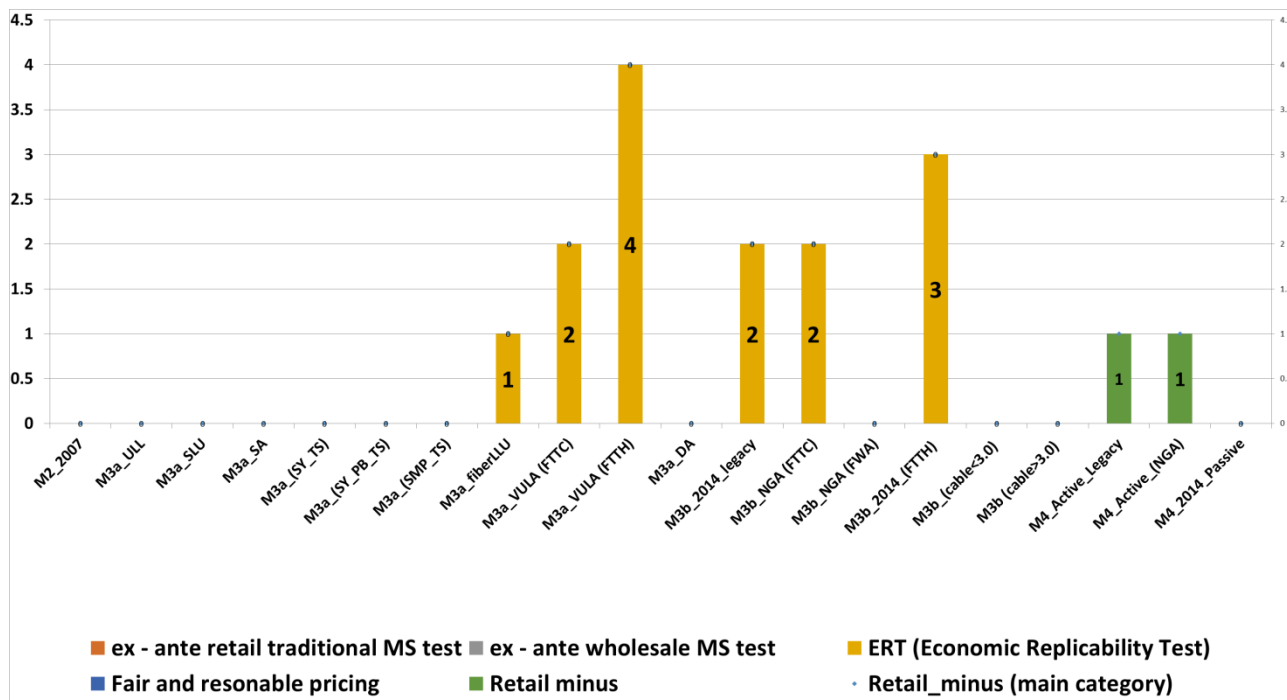
Figure 22 - Price control sub category Cost Orientation



Source: BEREC RA Database 2021

The ERT price control methodology has been mainly applied to VULA and NGA products in line with the Commission Recommendation on Costing Methodologies. Retail minus is currently applied in only one member state in market 4 (Figure 23).

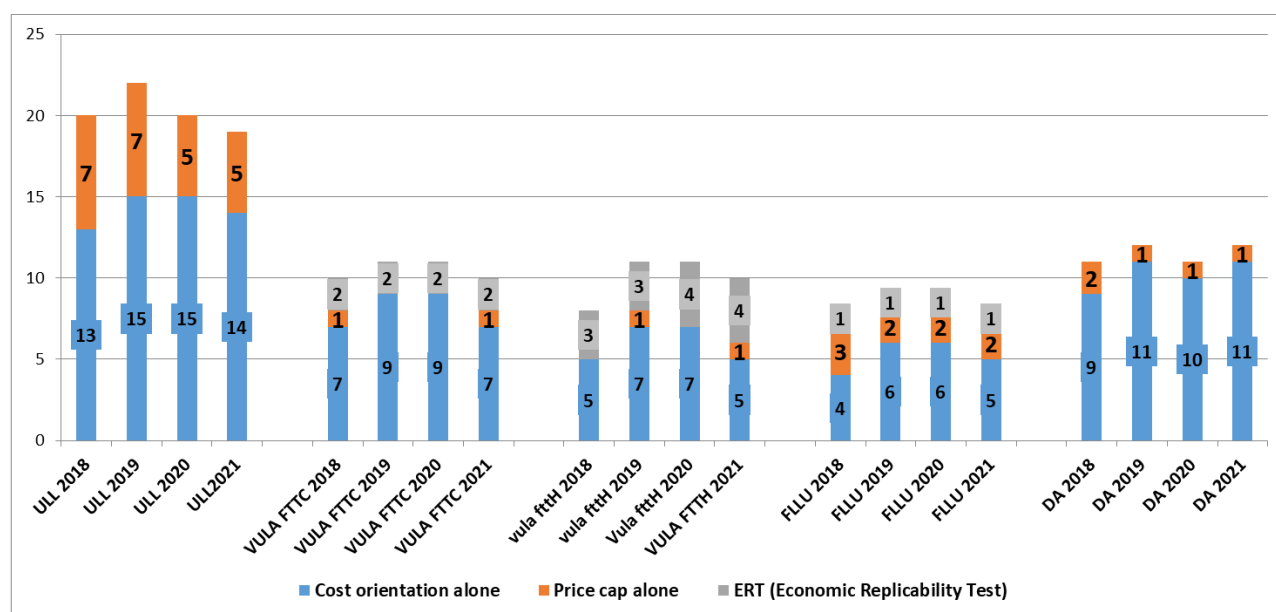
Figure 23 - Price control sub categories market 3a



Source: BEREC RA Database 2021

In figure 24 the evolution over time for EU countries for the sub category price control for products in access markets within the last four years is given, providing information also on what NRA has changed sub category.

Figure 24 - Price control sub categories market 3a

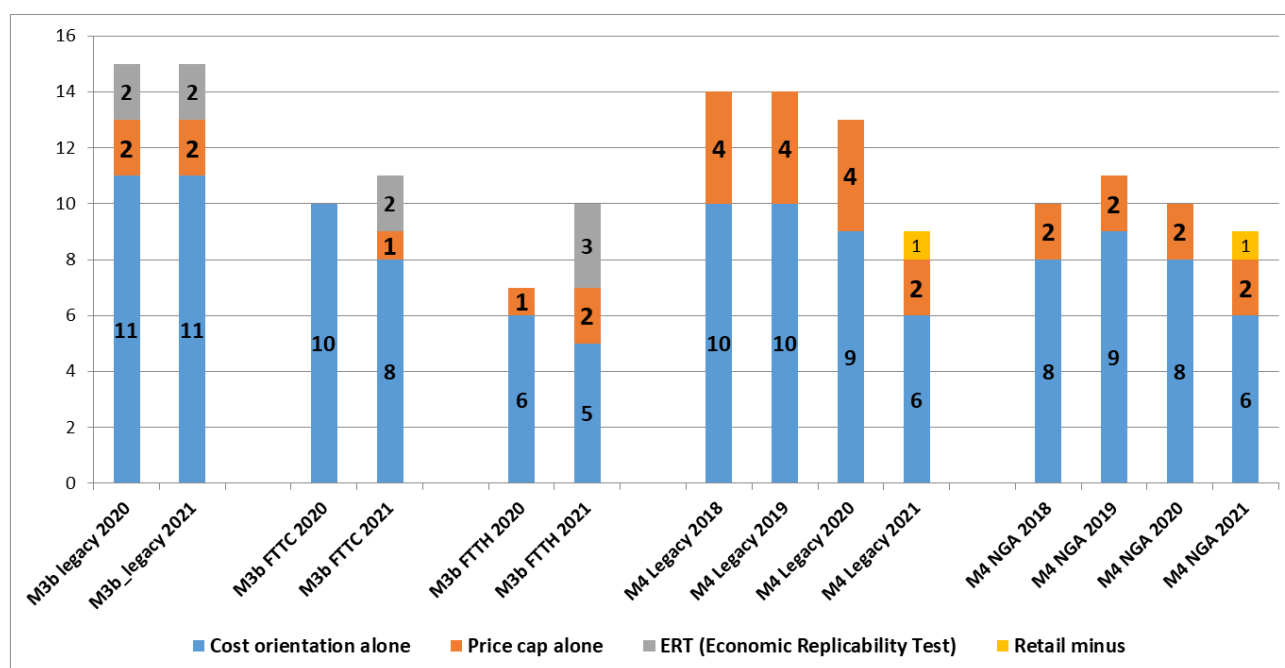


Product	2021	2020	2019
ULL	EE (no more cost orientation)	NL-BG (no more regulation from Price cap)	LV (implemented cost orientation alone), PL (implemented cost orientation alone)
VULA FTTC	LT (No more regulation from cost orientation alone), HR (From cost orientation alone to Price cap)		BE (started to be regulated Cost orientation alone), LV (implemented cost orientation alone), NL (no more regulation from price cap)
VULA FTTH	HR (From cost orientation alone to Price cap), LT (No more regulation from cost orientation alone)	NL (no more regulation from Price cap)	BE-FI (started to be regulated Other/combination), NL (started to be regulated Price cap), LV (implemented cost orientation alone), HR started to be regulated (Cost orientation alone)
FLLU	MT (no more regulation), FI (from Price cap to cost orientation alone); HR (From cost orientation alone to Price cap)		NL (no more regulation from Price Cap), LV (implemented cost orientation alone)
DA	EL (start to regulate with cost orientation alone)	PL (start to regulate with cost orientation), SE (removed regulation from cost orientation alone, BG (removed regulation from cost orientation alone)	LV (implemented cost orientation alone) LU (removed access obligation from Price cap), HR (start to regulate through Cost orientation alone),

Source: BEREC RA Database 2021

Looking at market 3b and 4 the following evolution is observed: an increased implementation of price control regulation related to NGA/FTTH in market 3b, where a reduction of price control regulation of the legacy product in market 4 is observed.

Figure 25 - Price control sub categories market 3b and 4



Product	2021	2020
MK3b FTTC	AT-SI (start to apply apply ERT),HR (moved from Cost orientation alone to Price cap),LT (No more regulation from cost orientation alone)	
MK3b FTTH	AT-ES-SI (start to apply ERT),HR (moved from Cost orientation alone to Price cap)	
M4 legacy	AT(from Price cap to No regulation), EL (from cost orientation to retail minus), HU-IT-SI (from cost orientation to no regulation)	LV-RO (removed regulation from cost orientation)
M4 NGA	EL from cost orientation alone to retail minus); SI (removed regulation from cost orientation)	LV (removed regulation from cost orientation)

Source: BEREC RA Database 2021

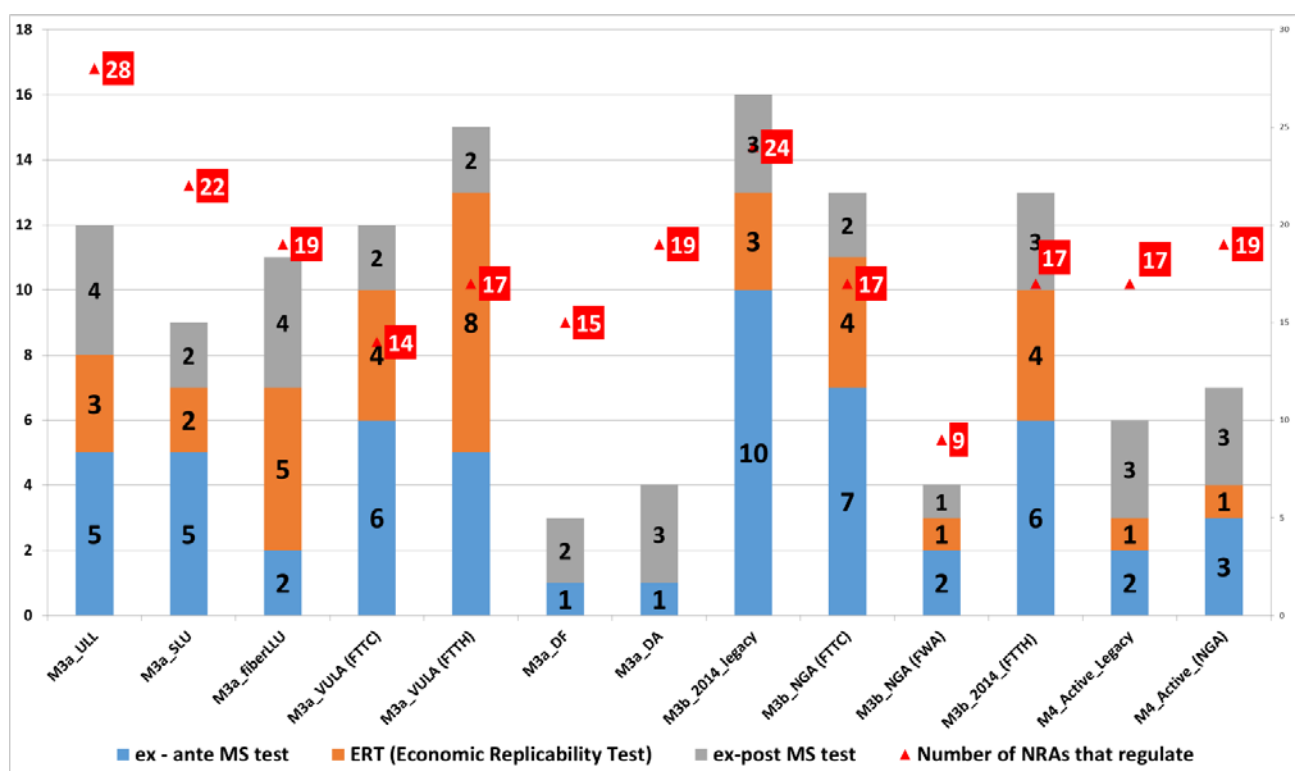
The following part provides information on the implementation of margin squeeze tests and non-discrimination models adopted.

#### The non-discrimination framework in the context of price control

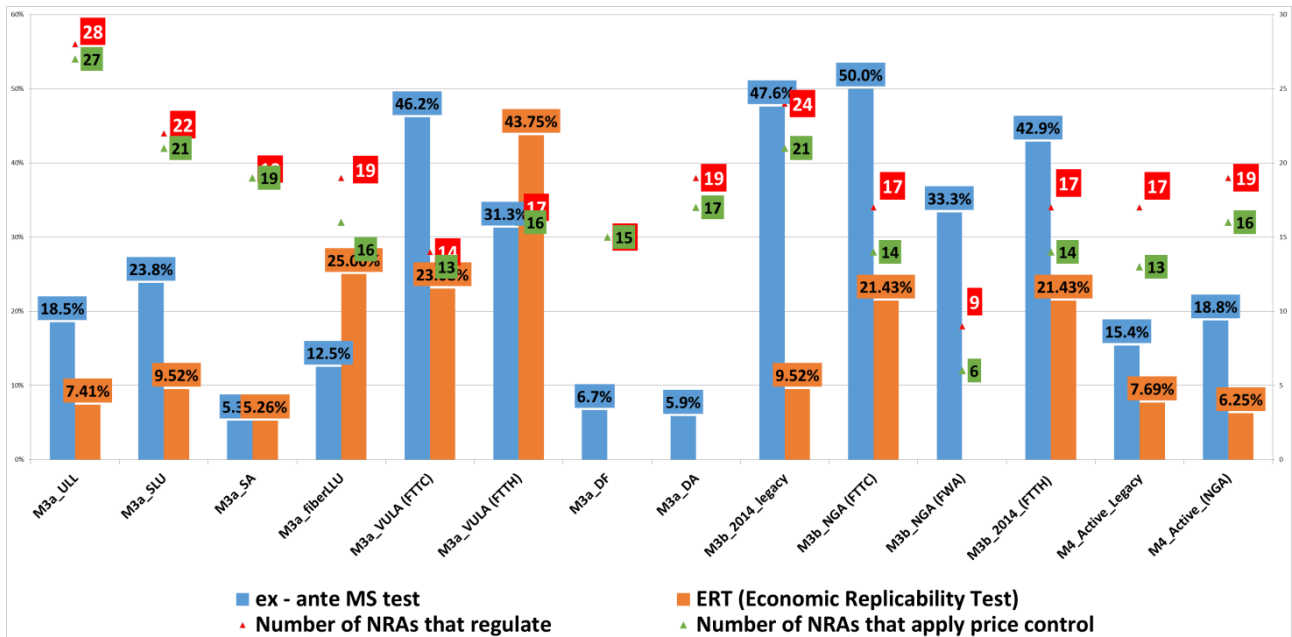
The ERT (or the traditional margin squeeze test) has a two-folded nature: it can be used as a price control remedy (art. 13 of the AD, now art. 74 of the EEC), or as a non-discrimination remedy (art. 10 of the AD, now art. 70 of the EEC). This is in line with the principle that the ERT must be undertaken by NRAs in light of the regulatory objective to promote sustainable competition and efficient investment - it must be based on the specific competitive concern identified in the market analysis. However, also a different case exists: art. 13 AD 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 a legal basis to ensure that the cost orientation obligation may be tested ex-post without an explicit imposition of an ex-ante price control methodology; otherwise the general imposition of art. 13 as legal basis 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. Up to now, the statement of the NDCM

Recommendation on the ERT for NGA products as the alternative for ex ante price control has not been fully applied, as highlighted in the previous paragraph. Summing up, margin squeeze tests have been used mainly as a complementary measure for a price control method, within the article 13 AD legal framework. The given options were (see BoR (14) 190): i) ex-ante margin squeeze test; ii) ERT (Economic Replicability Test); iii) ex-post retail margin squeeze test. A combination of price control and a retail margin squeeze test/ERT test has been applied only for specific access products (e. g. the flagship wholesale products on which the retail margin squeeze test has been applied). For example, about 30% of NRAs that apply an LLU price control also apply a form of ex ante replicability test. For VULA FTTH this share can reach 70% (Figure 26 b)<sup>35</sup>, 43% of NRAs apply an ERT test, indicating that the application of the margin squeeze test becomes more relevant for NGA products in market 3a.

Figure 26 a / b - Margin squeeze tests and % of NRAs that apply a margin squeeze test in combination with price control



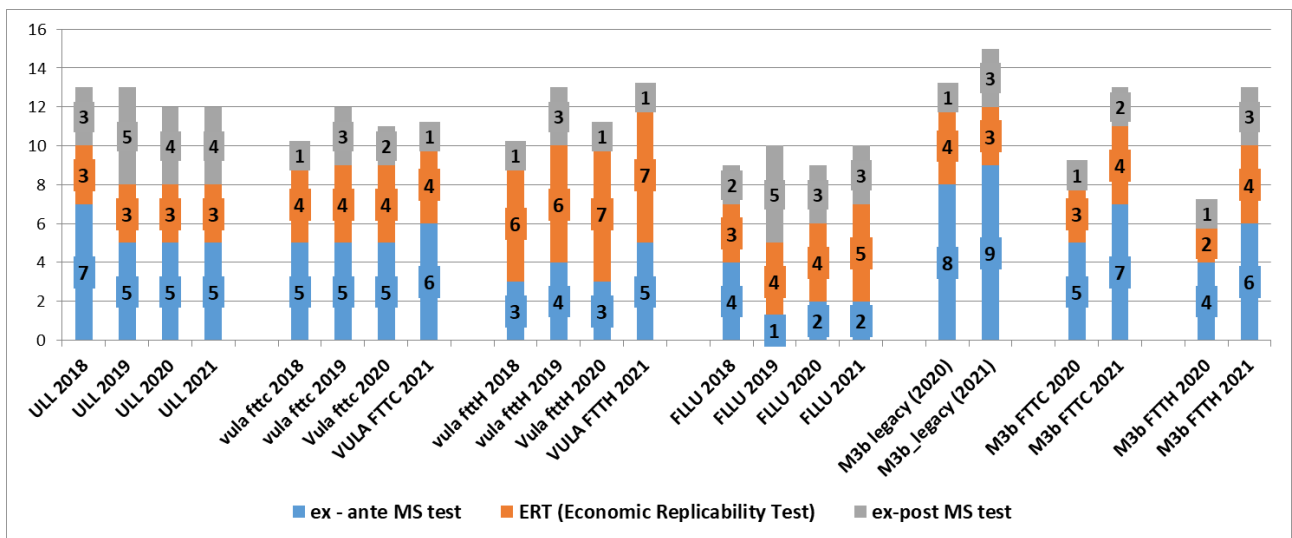
<sup>35</sup> In figure 26 a and b EU and non-EU countries have been included. In figure 27 only EU countries have been considered.



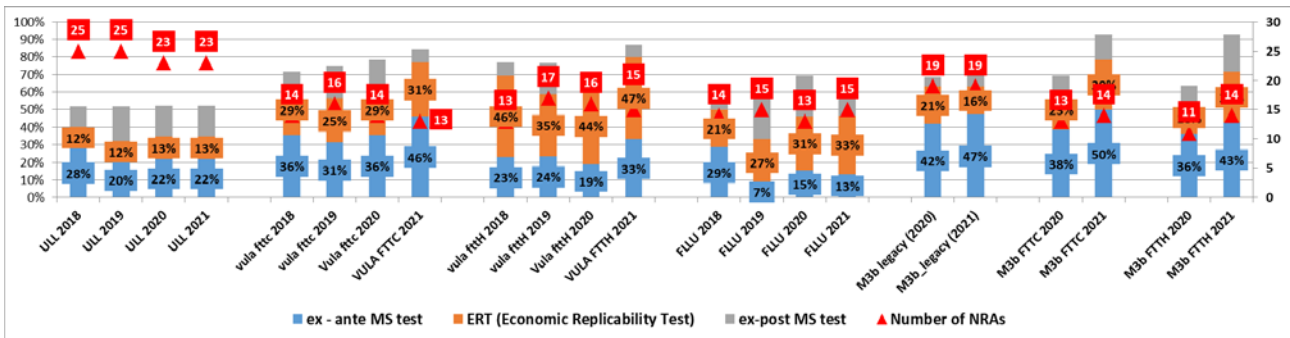
Source: BEREC RA Database 2021

In the figure below, the corresponding evolution along the years in terms of numbers and percentage of NRAs that apply a margin squeeze test in combination with price control is provided for EU countries. The analysis shows that the instrument of margin squeeze test is slightly increasing over time, specifically for FTTH and NGA.

Figure 27 - Margin squeeze tests and % of NRAs that apply a margin squeeze test in combination with price control



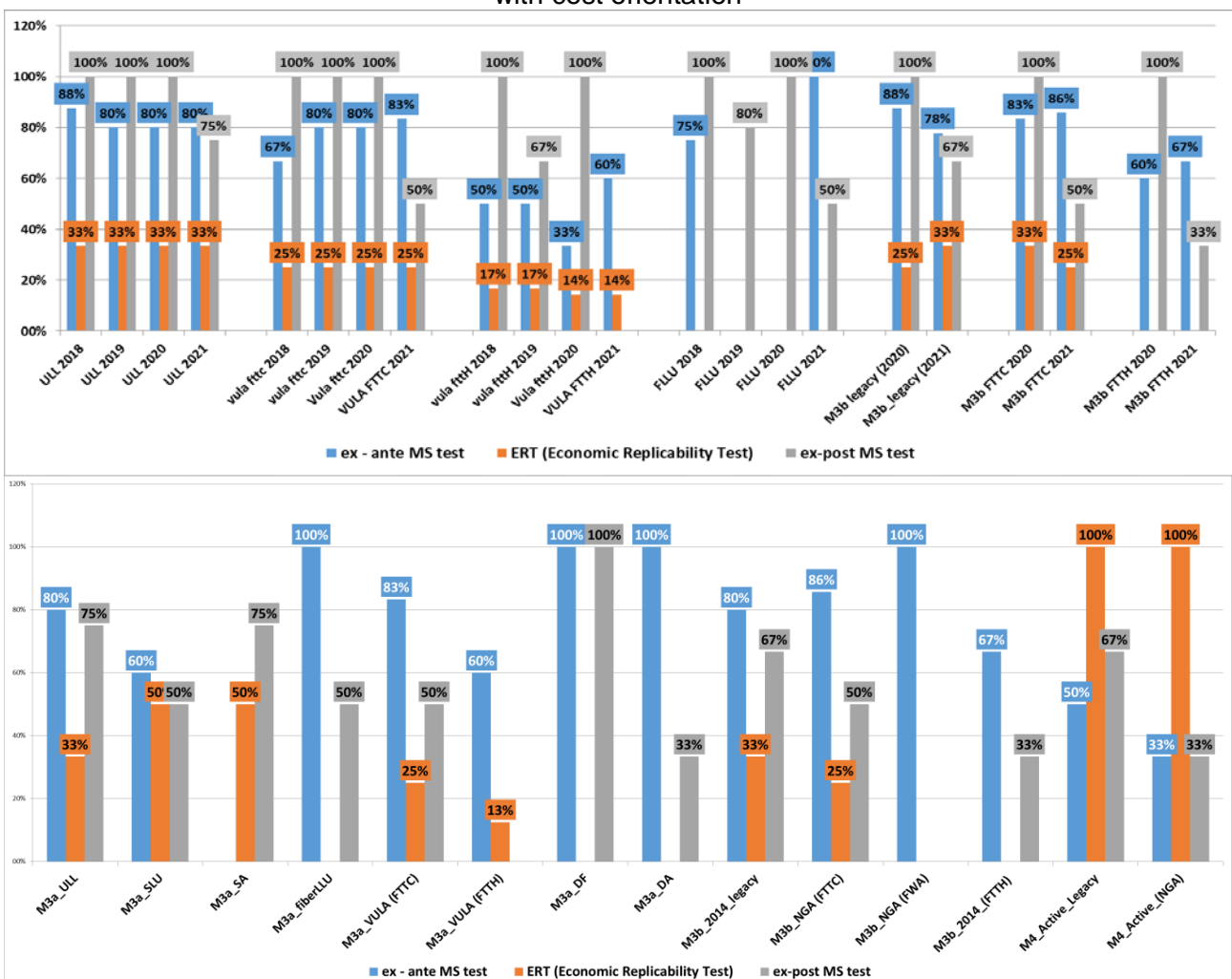




Source: BEREC RA Database 2021

In Figure 28 the percentage of NRAs that apply the ex-ante or ex-post replicability test is shown for NRAs that have chosen cost orientation as the main category. The traditional ex ante margin squeeze test is considered to be more of a complementary tool of cost orientation in market 3a and 3b, whereas the Economic replicability test is applied more frequently as a substitute for the price control method in market 3a for VULA and FLLU

Figure 28 - Margin squeeze test and % of NRAs that apply a margin squeeze test in combination with cost orientation

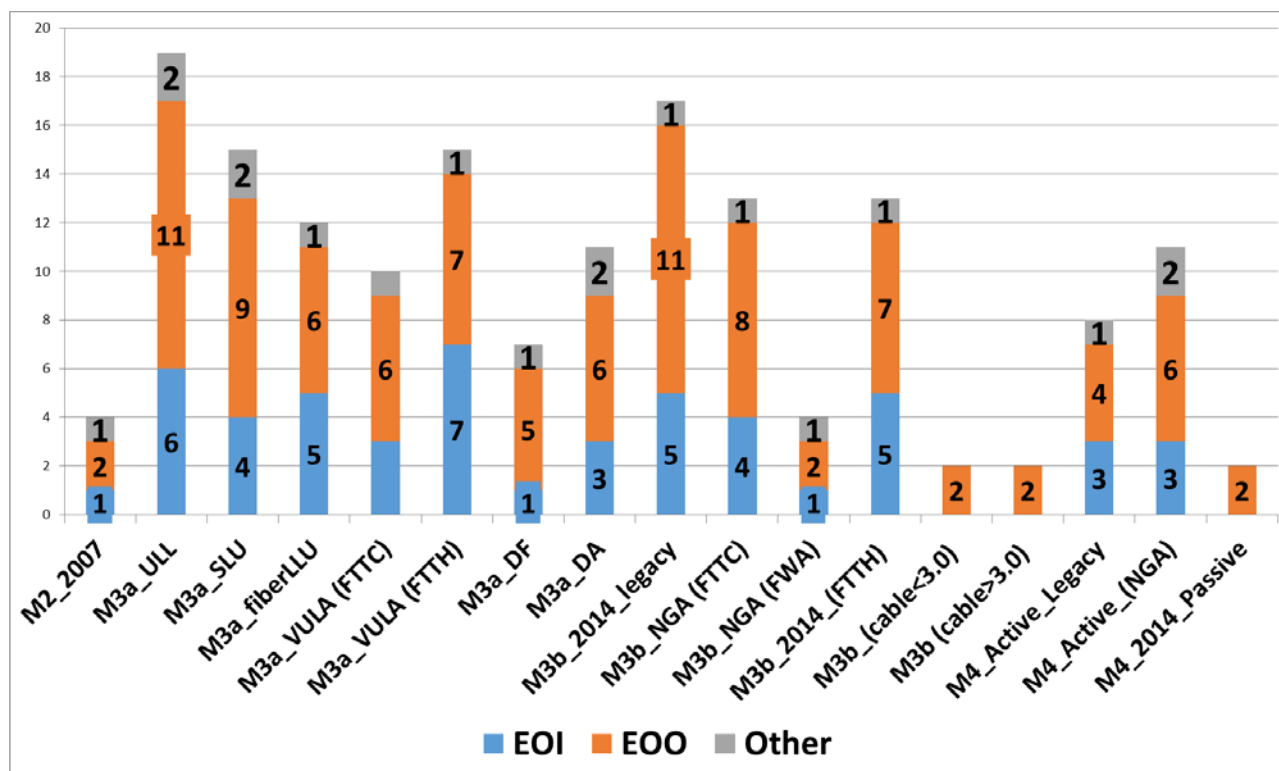


Source: BEREC RA Database 2021

### Equivalence model

The options for Equivalence models currently in force for different products are: EoI<sup>36</sup>, EoO<sup>37</sup> and “Other”<sup>38</sup>. In absolute terms there is a small increase in the number of NRAs that impose EoI/EoO models; this is more evident for products like VULA FTTH and in relation to market 3b. In figure 29 the evolution over time is provided (only EU NRAs).

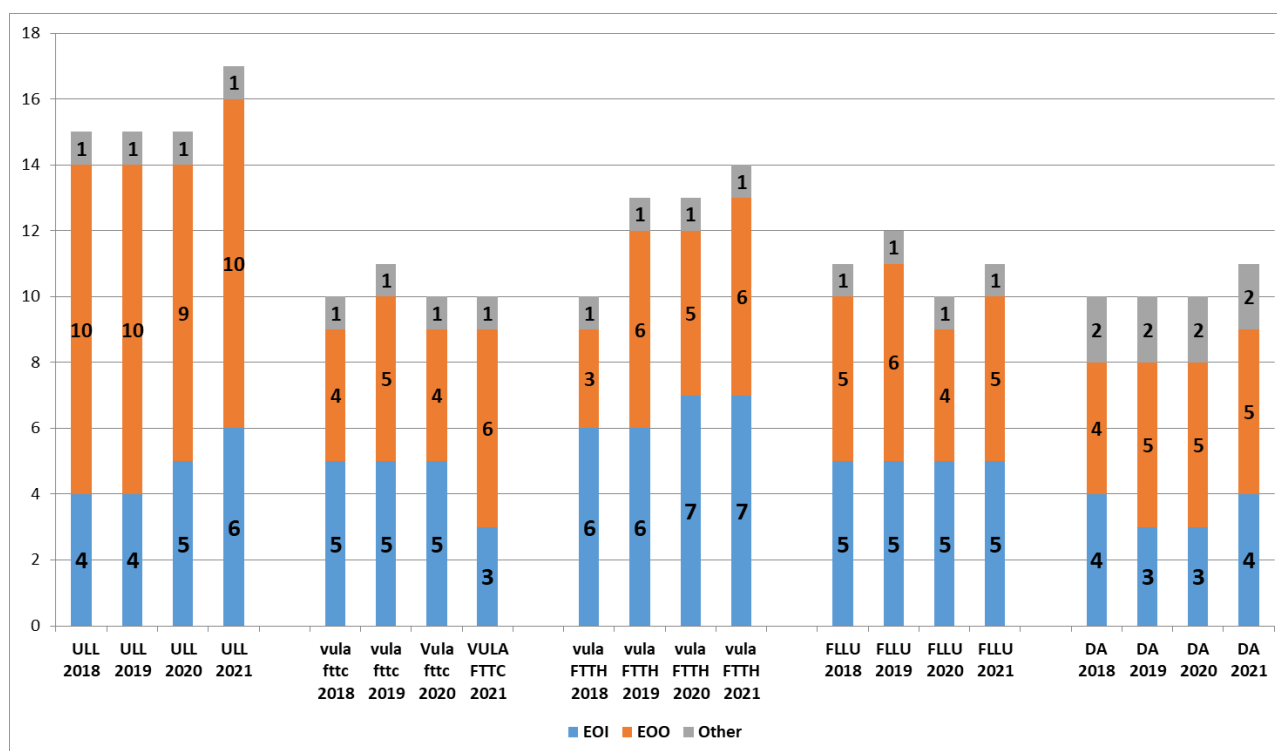
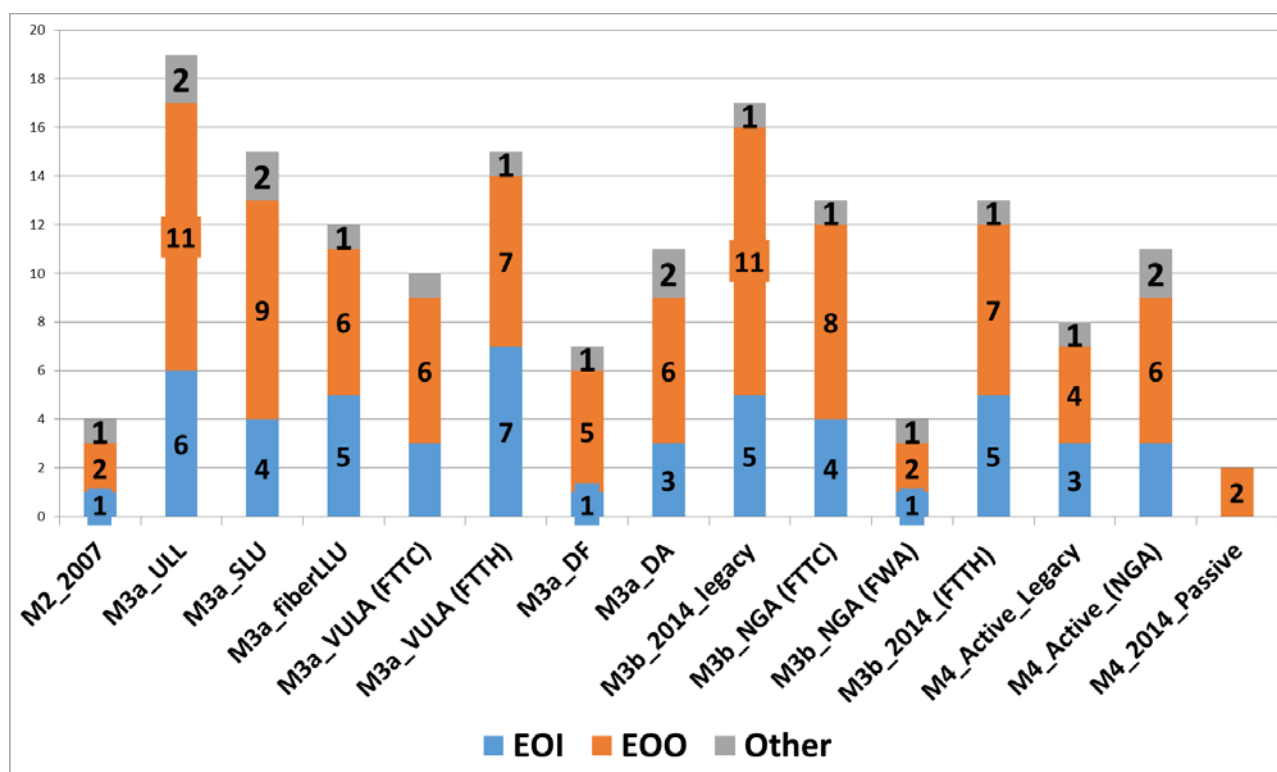
Figure 29 a / b - EOO-EoI equivalence model



<sup>36</sup> ‘Equivalence of Input (EoI)’ means the provision of services and information to internal and third-party access seekers on the same terms and conditions, including price and quality of service levels, within the same time scales using the same systems and processes, and with the same degree of reliability and performance. EoI as defined here may apply to the access products and associated and ancillary services necessary for providing the ‘wholesale inputs’ to internal and third party access seekers.

<sup>37</sup> ‘Equivalence of Output (EoO)’ means the provision to access seekers of wholesale inputs comparable, in terms of functionality and price, to those the SMP operator provides internally to its own downstream businesses, even if using potentially different systems and processes.

<sup>38</sup> ‘Other’ is a residual option for enhanced non-discrimination obligation not properly filed under EoI/EoO.

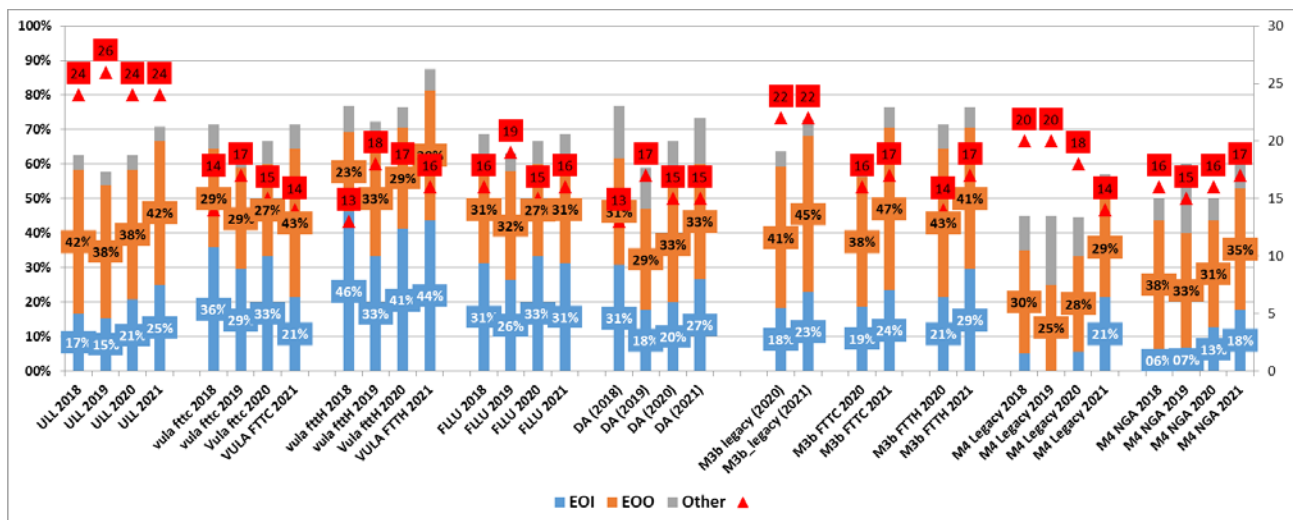
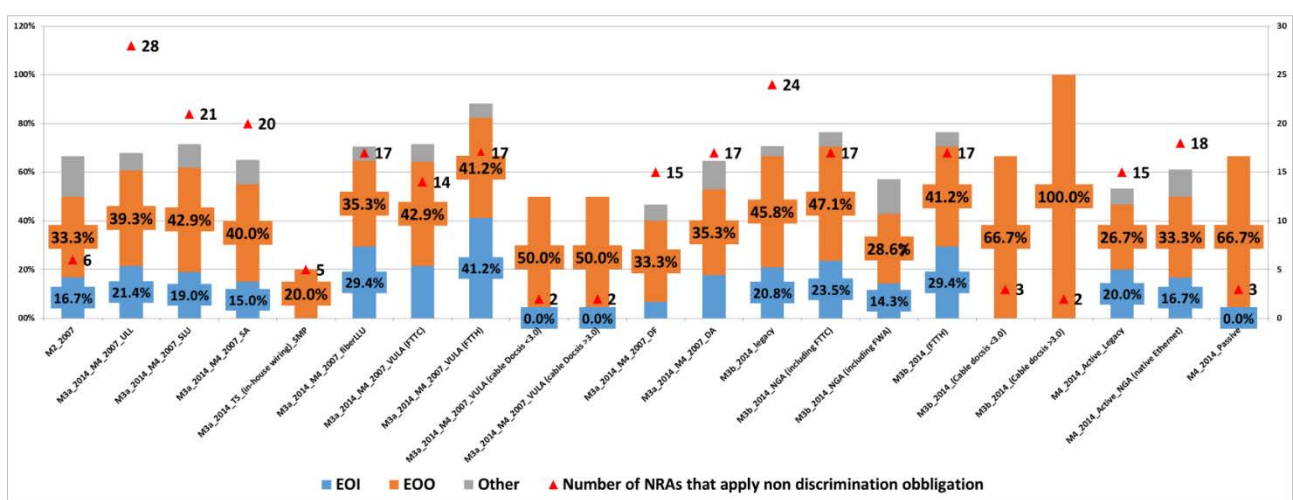


Source: BEREC RA Database 2021

In Figure 30 the percentage of NRAs that apply EoI/EoO in relation to the total number of NRAs that apply a non-discrimination obligation for the corresponding product is provided for each product. Overall, the application of EoI models is increasing over the years. The cumulative percentage of EoO and/or EoI is higher in relative terms in case of VULA (FTTH) as well as for market 3b. In figure 31 the percentage of NRAs that apply EoI and/or EoO in relation to NRAs that apply it in combination with cost orientation is shown. More than 60% of NRAs that apply cost orientation also apply a non-discrimination obligation for access products (EoO or EoI). Nevertheless, where EoI is in charge,

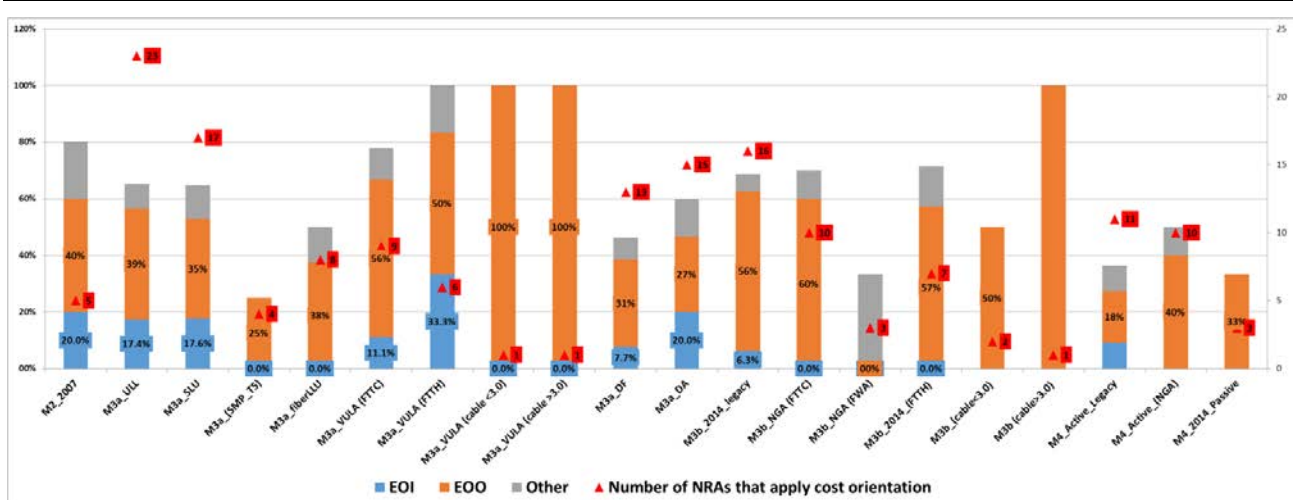
cost orientation is increasingly being relaxed, particularly in case of NGA and VHCN products. For market 3b all NRAs that apply EOI do not apply any cost orientation when regulating the corresponding product.

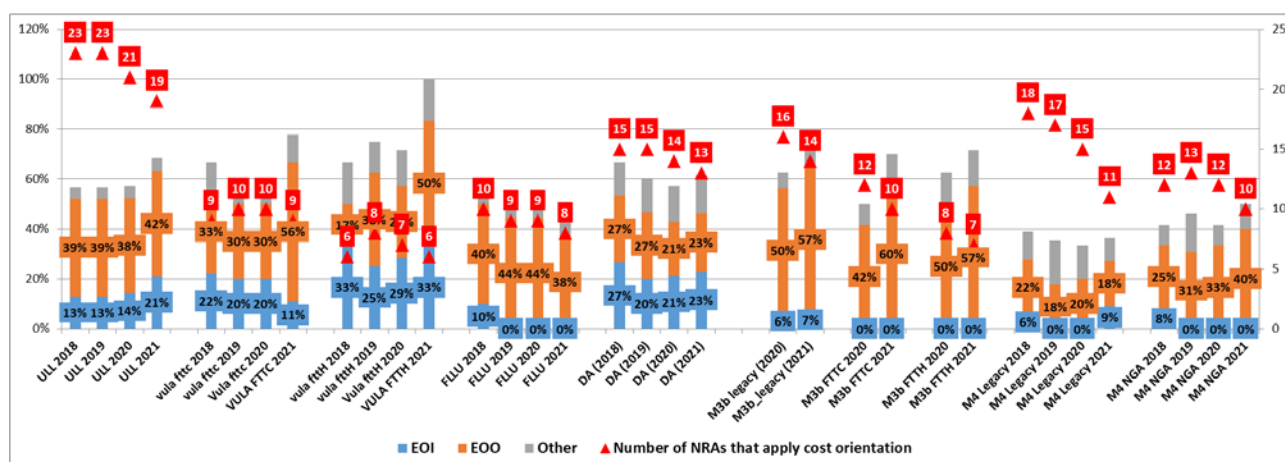
Figure 30 - EOO-EOI equivalence models with respect to the non-discrimination obligation



Source: BEREC RA Database 2021

Figure 31 - EOO-EOI equivalence model with respect to cost orientation obligation





Source: BEREC RA Database 2021

### 3.3 Cost base, annualisation and cost allocation methodologies

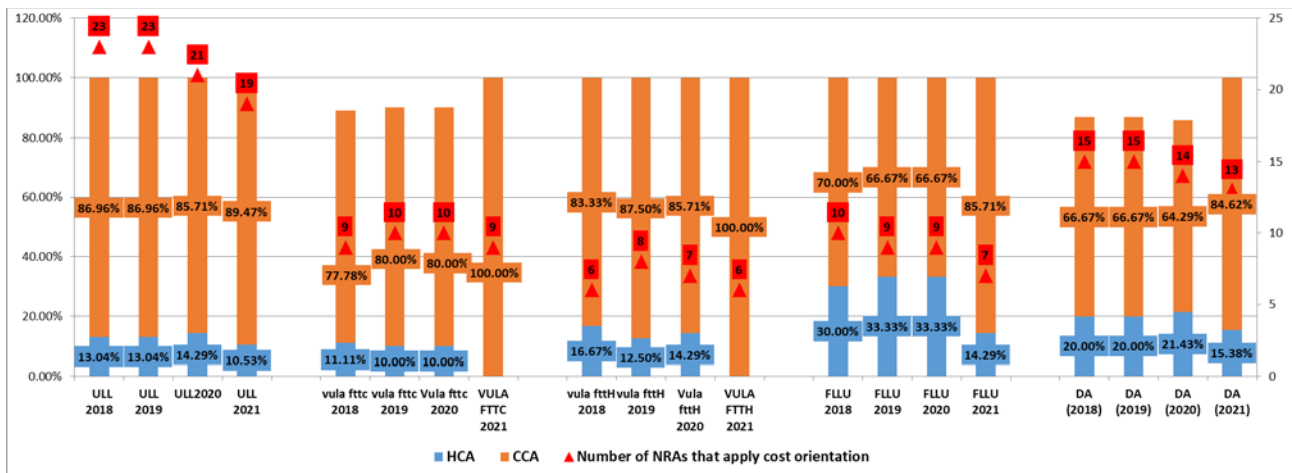
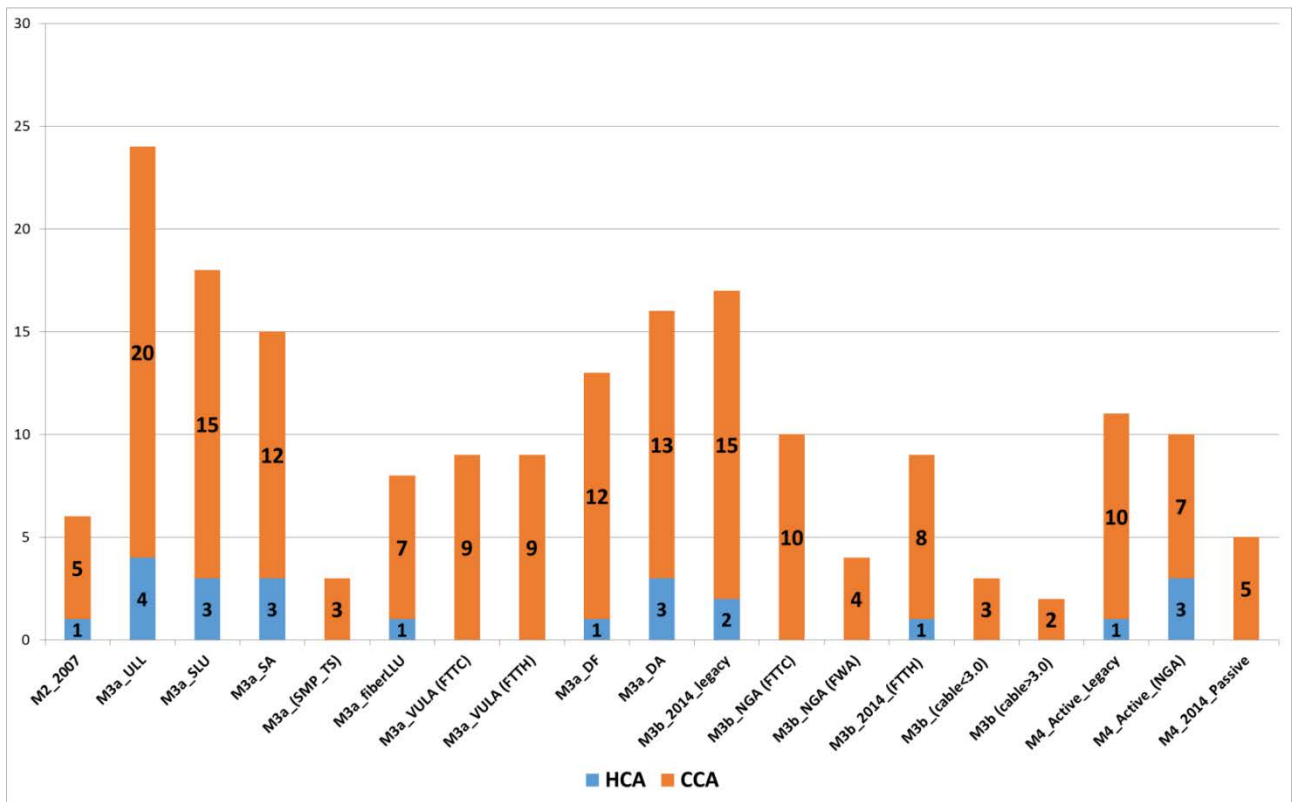
#### Cost base

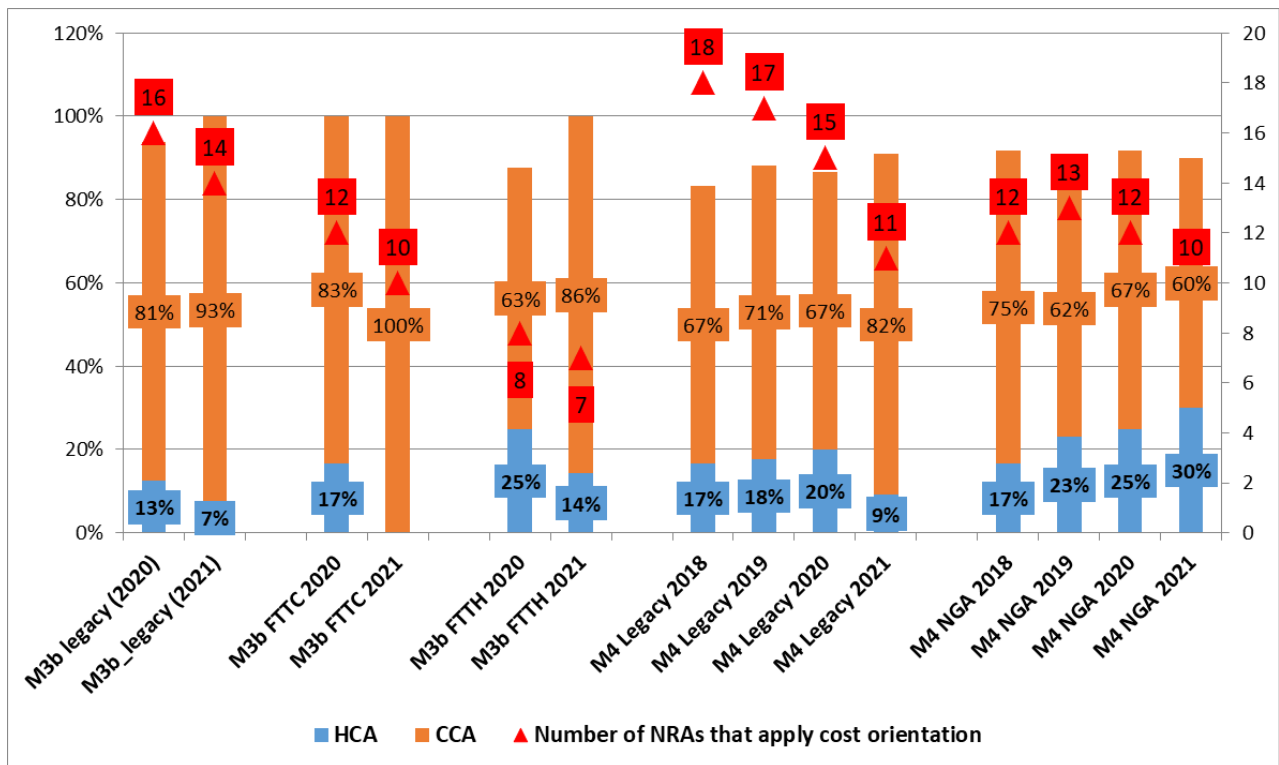
With reference to the cost base, Figure 31 shows that in 2021 CCA is by far the most commonly used methodology for all markets with the exception of WLR, where HCA is more frequently used. The situation remained stable in comparison to last year's survey.

In the following figure the type of cost base in use when price control is in charge is shown. HCA is a relevant cost base only when an FDC approach is applied as accounting method. In the corresponding figure the evolution over time of the cost base is given (considering only EU-NRAs) for those NRAs that used cost orientation as the main category of the price control. It is clear that the use of CCA-OCM is increasing where cost orientation is applied.<sup>39</sup> In market 4, HCA is still more frequent in relative terms where cost orientation is applied. The use of HCA is common when NRAs are at the early stage of regulation; they move to CCA before (eventually) deregulating.

<sup>39</sup> When the percentage reported is less than 100% it means that no information is available for NRAs that applied cost orientation over the years.

Figure 32 - Cost base used





Source: BEREC RA Database 2021

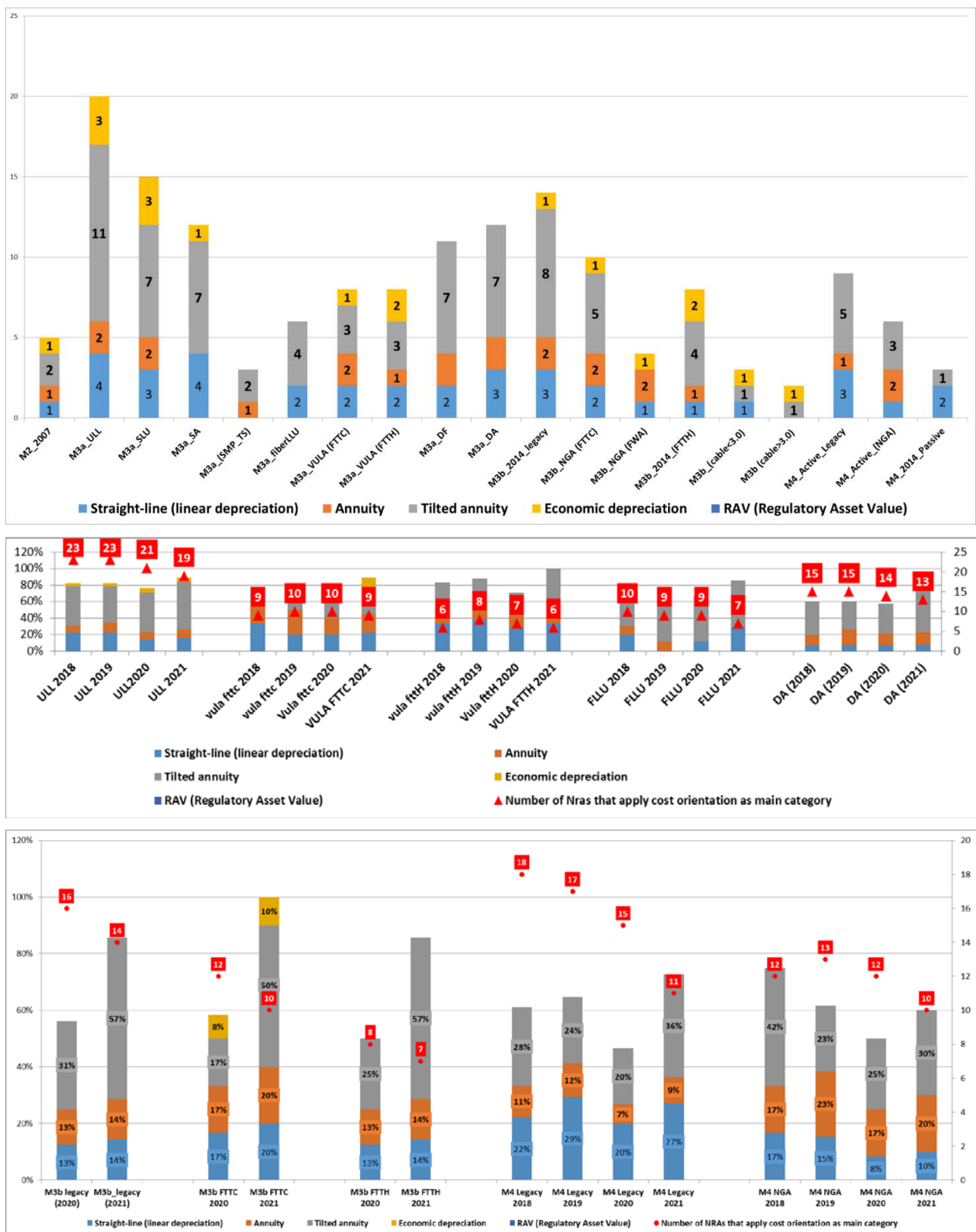
### Annualisation

Annualisation methodologies within the CCA category are represented in Figure 33 – Annualisation method

The most frequently used approach is the tilted annuity. Standard annuity and straight line follow. Looking at the trend over time the highlighted result is even more valid; when cost orientation is applied the tilted annuity is the most frequently used methodology. Only the information of those NRAs that apply cost orientation is reported for EU countries. The number of NRAs refers to the number of NRAs that apply cost orientation as the main category for the corresponding product.



Figure 33 - Annualisation method



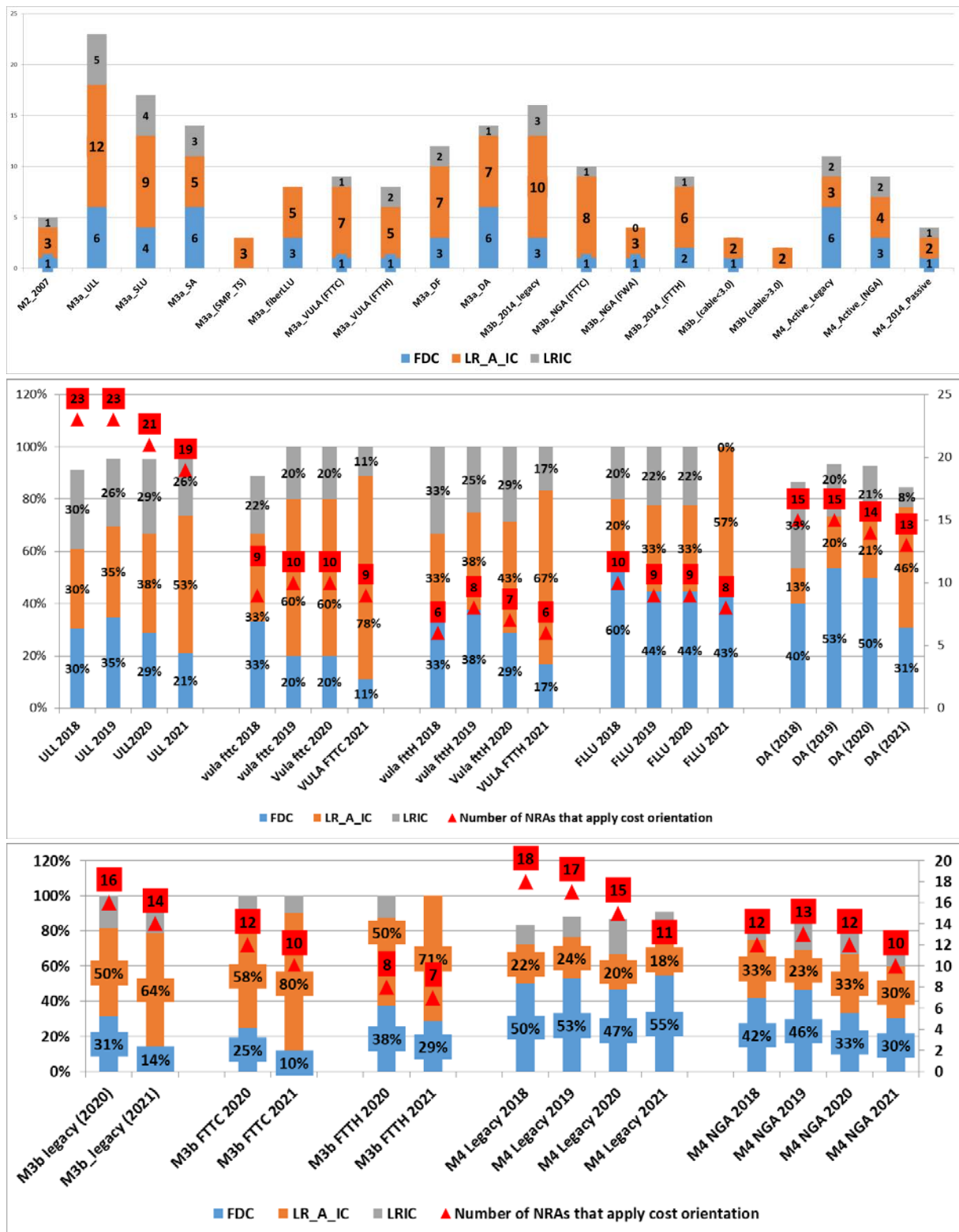
Source: BEREC RA Database 2021



Cost Allocation

Figure 34 shows the main cost allocation methodologies used in each market. Where no sub categories were selected, a hybrid approach is generally in use.

Figure 34 - Cost Allocation methods

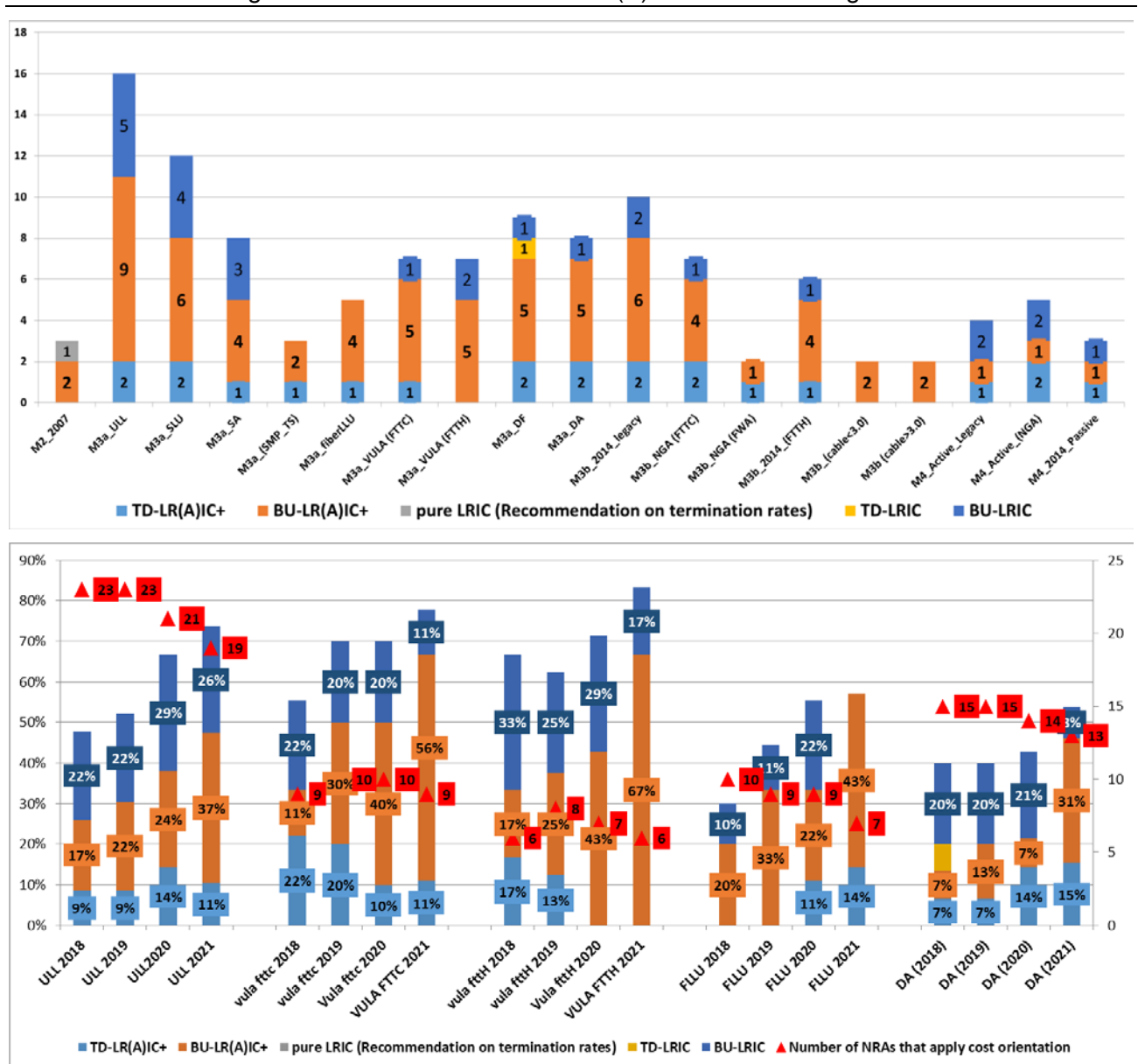


Source: BEREC RA Database 2021

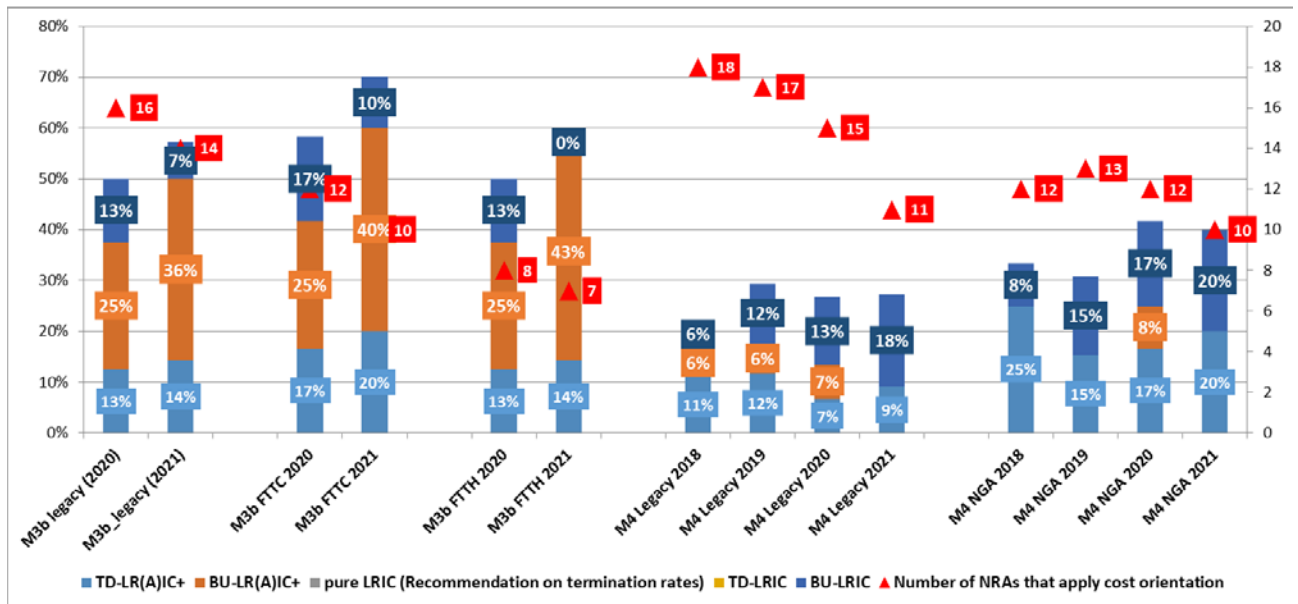
The most frequent cost allocation approach remains LRIC/LR(A)IC for almost all products/markets. FDC is a frequent approach for Market 4 legacy network. In comparison to last year a reduction of FDC also is seen for Market 3b for legacy and NGA products. The modelling approach is becoming the preferred option where cost orientation is applied as a price control method (in any case, the number of NRAs that apply cost orientation is not increasing).

In Figure 35 the sub categories of allocation methodologies are represented<sup>40</sup>. As for the main categories, NRAs that apply a price control method are depicted in terms of percentage of adoption of the corresponding methodology. When LR(A)IC/LRIC has been chosen as the main category, the most common approach is Bottom-up. Where no sub categories are selected, a hybrid approach is generally in use.

Figure 35 - Allocation methods LR(A)IC-LRIC sub categories



<sup>40</sup> The sum for sub categories is lower than the record for the main category where NRAs did not provide information on sub categories.



Source: BEREC RA Database 2021

### 3.4 Combination of price control methods/cost base/allocation methodologies

To obtain a more accurate picture of the NRAs regulatory accounting approach, we analyse how price control and costing methodologies are applied according to main indicators of the competitive situation. This section provides an overview of the relationship between price control methodologies and applied costing methodologies. For this analysis, sub categories classified as LR(A)IC (TD), LRIC (TD) and LR(A)IC (BU), LRIC (BU) have been grouped together.<sup>41</sup>

The following combinations of price control and cost accounting methodologies have been considered:

Figure 36 - 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

Source: BEREC RA Database 2021

<sup>41</sup> NRAs that did not provide information on sub categories are not represented. For this reason the number of NRAs may differ from the number reported previously (overall number of NRAs that have provided information).

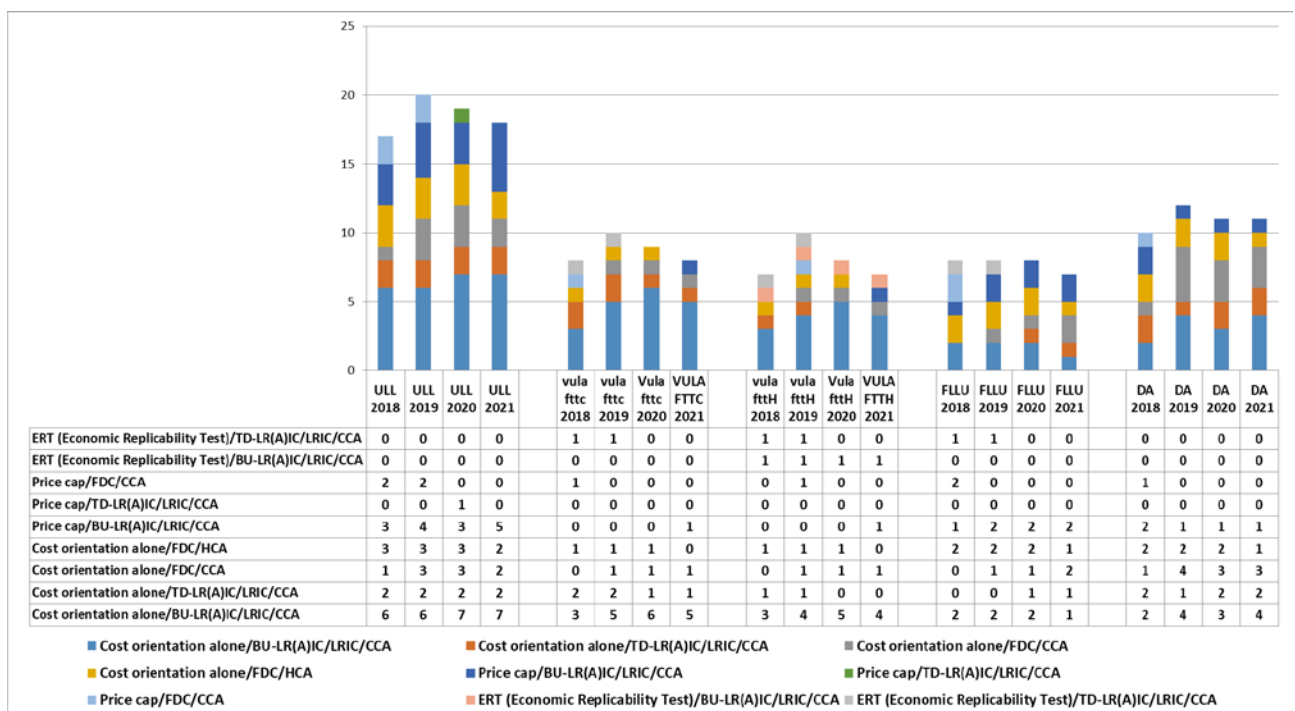
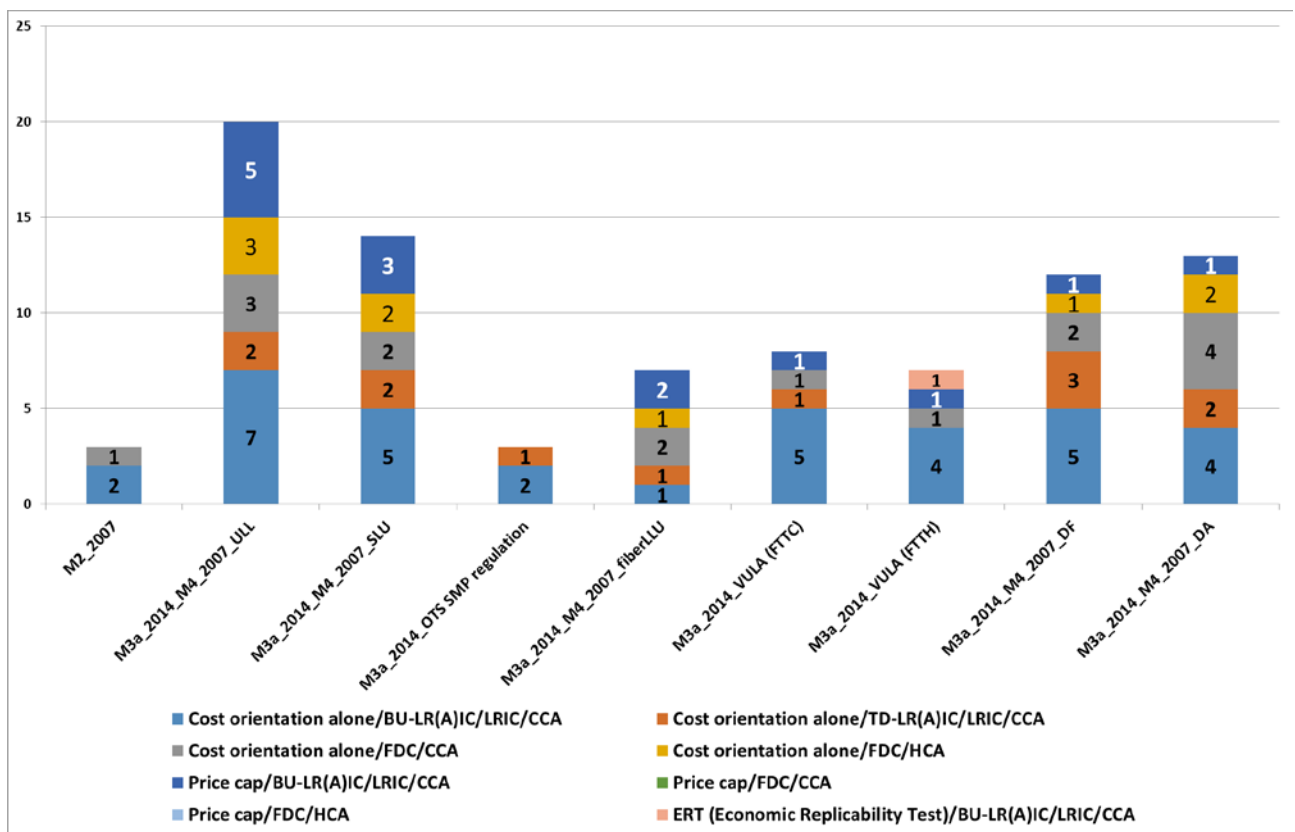
The goal is to examine if there is a relation between the way price control is imposed related to costing methodologies applied in different products/markets.

Differences between NRAs may be explained with specific country conditions, e. g. taking into account different competitive conditions in relevant markets. Forms of price regulation and accounting systems currently in force represent the “fine tuning” of regulatory instruments used by NRAs in order to address different competitive situations. This indicates that regulatory accounting has become more sophisticated over time, adapting to more complex market situations.

### **3.4.2 Products in Market 3a**

In Figure 37 the combination of costing methodologies and price control is represented for products in market 3a (only combinations with at least two records are shown). There seems to be no clear preference for costing methodologies in relation to the kind of price control in use, apart from the main legacy product (LLU). For this product most NRAs apply a cost orientation alone/LRIC-LR(A)IC/CCA approach; a second group applies Price cap with a BU costing methodology approach. The same holds true for FTTC and FTTH in case those product are regulated. A more differentiated approach seems to emerge for FLLU, where a top down (or accounting) method is also frequent. In the same picture the evolution over time is provided considering only EU NRAs over the last four years. Where some form of price control is applied, the BU-LR(A)IC approach appears to be more frequent for all products in relative terms with the only exception: FLLU (it is likely that regulation of this product is at an early stage while competition can be effectively achieved through VULA products).

Figure 37 - Combination price control / costing methodologies (ex Mk 2-M3a)



Source: BEREC RA Database 2021

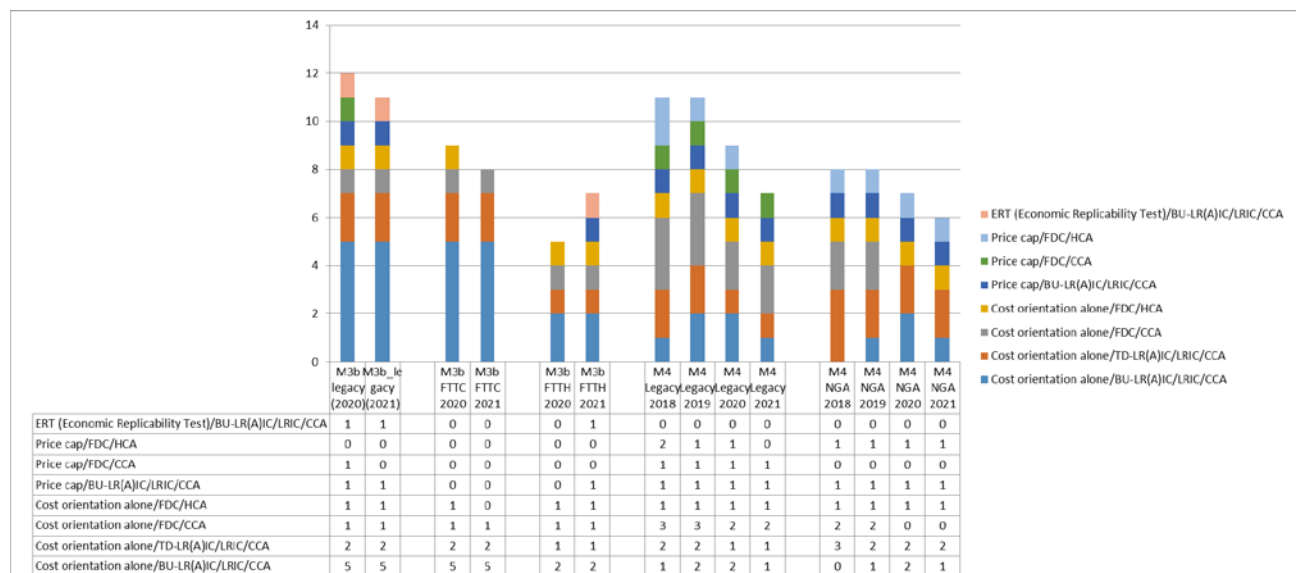
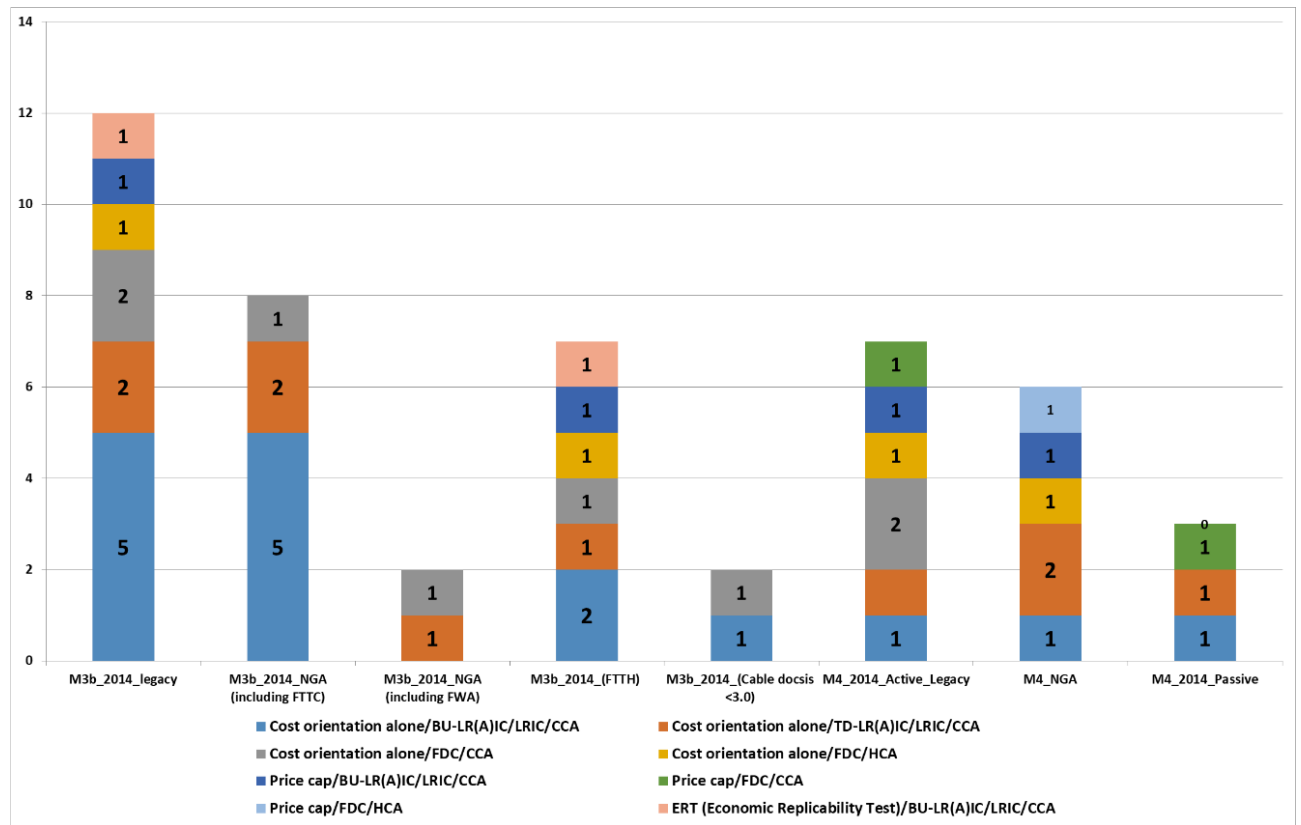
With reference to the asset base in use for these products, a bottom-up model is most common when cost orientation alone is used as price control methodology. Generally, there is an increase in the use of the combination of cost orientation/price cap with a BU-LRIC approach and a reduction of accounting methodologies based on FDC; A TD approach is the least frequent by far.

In general, NRAs have declared homogeneous costing methodologies for products in each market.

### 3.4.3 Market 3b and 4

In Figure 38 the combination of costing and price control methodologies is presented for products in markets 3b and 4 for all NRAs that have provided information for 2021 RA report; the corresponding evolution over the last four years for EU countries only is shown.

Figure 38 - Combination price control / costing methods (M3b and 4)



Source: BEREC RA Database 2021

### 3.5 Implementation of the Non-discrimination and Costing Methodologies Recommendation

This section provides an update of the implementation of the NDCM (2013/466/EU)", with regard to costing methodologies.

NRAs were asked how they implement the framework of the Recommendation in Market 3a, by choosing the following options: i) Rec. 30-37 (CCA-BU LRIC+); or ii) Rec. 40.

Figure 39 - EC Recommendations

EC Recommendations	Content
Rec. 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.
Rec. 40	NRAs may continue to apply the costing methodology that they use at the time of entry into force of the Recommendation beyond the 31 <sup>st</sup> December 2016, if it meets the general objectives of consistency, predictability and price stability over time during the migration from legacy to NGA network (recital 25-28) and <i>inter alia</i> : <ol style="list-style-type: none"> <li data-bbox="587 909 1465 978">i. it should reflect a gradual shift from the copper network to an NGA network;</li> <li data-bbox="587 978 1465 1077">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;</li> <li data-bbox="587 1077 1465 1176">iii. it should guarantee that copper network prices do not fluctuate significantly and therefore will remain stable over a long time period;</li> <li data-bbox="587 1176 1465 1240">iv. it should require only minimal modifications with respect to the costing methodology already in place.</li> </ol>

This year, 19 NRAs have provided answers to the proposed questions.<sup>42</sup> Results are presented in Figure 40.

<sup>42</sup> Two NRAs (SK-CZ) implement ERT instead of cost orientation also concerning LLU. CZ follows the Recommendation where applicable, but as the SMP operator adopts a functional separation, no cost orientation obligation on LLU has been imposed. BE doesn't follow the recommendation for LLU pricing since the price has been set before the issue of the Recommendation; neither the exception of Rec 40 or 42 are relevant for the implementation of LLU price. BE at the same time declared to use the general statement of recommend 30-37 for VULA-FTTH price calculation even though the product is not available.

Figure 40 - NRA implementation of EC Recommendations

	2016	2017	2018	2019	2020	2021
Do you implement Recommendations 30-37 (CCA BU-LRIC+)	7	9	11	11	14	14
Do you implement Recommendation 40	6	5	4	4	5	5

Source: BEREC RA Database 2021

Based on Rec. 30-37 and 40 of the Commission Recommendation, a few relevant questions have been included for some elements addressed by the Recommendation referred to DEA targets and reusable infrastructures<sup>43</sup>.

Replies by NRAs are summarised in Figure 40.

Figure 41 - NRAs information on Recommendations 37 and 40

	2018	2019	2020	2021
Do you consider the DEA target in your model	6	6	7	7
Do you take into account reusable civil infrastructure?	12	12	13	13
Do you consider copper cable to be reusable infrastructure?	6	6	4	4
Is a gradual shift from copper network to NGA network taken into account?	8	8	8	7

Source: BEREC RA Database 2021

DEA targets<sup>44</sup> have been implemented in the BU-LRIC model by 8 NRAs.

<sup>43</sup> Specifically in the Rec. 32 the Commission has considered the following elements: "When modelling an NGA network NRAs should define a hypothetical efficient NGA network, capable of delivering the Digital Agenda for Europe targets set out in terms of bandwidth, coverage and take-up, which consists wholly or partly of optical elements. When modelling an NGA network, NRAs should include any existing civil engineering assets that are generally also capable of hosting an NGA network as well as civil engineering assets that will have to be newly constructed to host an NGA network. Therefore, when building the BU LRIC + model, NRAs should not assume the construction of an entirely new civil infrastructure network for deploying an NGA network". Recommendation 40 states: "if not modelling an NGA network, it should reflect a gradual shift from a copper network to an NGA network". On the base of this statement of the Recommendation, some questions about DEA targets and reusable infrastructure have been added.

<sup>44</sup> The coverage at least of 30 Mbps to 100 % and take-up of the population at 50 % at 100 Mbps.



The majority of NRAs that implement Rec. 30-37 or Rec. 40 include reusable civil infrastructures in their modelling process in line with last year; copper cable is considered to be reusable infrastructure by 4 NRAs. Furthermore, the analysis shows that the level of the depreciated infrastructure has been derived mainly from the accounting data of the SMP operator.

Figure 42 summarises the responses provided concerning the asset life of civil infrastructure, the percentage of civil infrastructure considered reusable and the percentage of asset life which has been already depreciated.<sup>45</sup> Only few NRAs have provided information on this aspect.

Figure 42 - NRA information on civil infrastructure

	Rec. 30-37	Rec. 40
<b>Civil infrastructure asset life (number of years) (minimum - maximum)</b>	30-50 for ducts; (arithmetic av.: 39) 10 NRAs 15-30 years for poles (3 NRAs)	30 1 NRAs
<b>Percentage of civil infrastructures considered reusable (minimum - maximum)</b>	18%-100% (arithmetic av. : 57%) 7 NRAs	100% 1 NRAs
<b>Percentage of asset life already depreciated of reusable civil infrastructures (minimum - maximum)</b>	20%-83% 4NRAs	

Source: BERECA RA Database 2021

### 3.6 Cost model technical implementation

The 2021 report also provides information on technical cost model implementation by NRAs<sup>46</sup>.

NRAs were asked to provide information on: i) asset base used; ii) network modelling approach (scorched earth vs scorched node); iii) Topology of the network modelled and architecture; iv) the way in which the level of coverage of the network is considered; and v) adjustments adopted for capex/opex efficiency in case top down models are used.

<sup>45</sup> In the figure only maximum and minimum are shown since only few NRAs have provided information.

<sup>46</sup> The information reported is independent from the main price control method (such as Cost orientation/Price cap/ERT) declared by NRAs in each market.

### Network modelling approach

Figure 43 summarises the main approaches used by NRAs to implement cost models. The scorched node approach assumes that the historical number of locations of the actual network node are fixed and that the operator can choose the best technology to configure the network in between these nodes. The scorched earth approach determines the efficient cost of a network that provides the same services as actual networks without placing any constraints on network configuration. A modified scorched node is in-between the two previous approaches. In case a BU asset base is in use the following situation is in force in 2021.

Figure 43 – General network modelling approach

	M3a_201 4_M4_20 07_Ull	M3a_201 4_M4_20 07_Slu	M3a_201 4_M4_20 07_fiberU	M3a_201 4_M4_20 07_VULA (FTTC)	M3a_201 4_M4_20 07_VULA (FTTH)	M3a_201 4_M4_20 07_DF	M3a_201 4_M4_20 07_DA	M3b_201 4_legacy	M3b_201 4_NGA (including FTTC)	M3b_201 4_(FTTH)	M3b_201 4_(Cable docsis <3.0)	M3b_201 4_(Cable docsis >3.0)
Scorched Node	5	3	2	2	3	2	1	4	4	3	2	2
Scorched earth	0	0	0	0	0	0	0	0	0	0	0	0
Modified Scorched node	7	6	1	1	2	3	3	4	1	1	0	0

Source: BEREC RA Database 2021

A scorched node is the most frequent approach used, also for NGA.

### Network topology and architecture

Figure 44 summarises the topology configuration used by NRAs for modelling purposes in markets 3a and 3b. The following options were provided: i) MDF/ODF area; ii) Municipality; a mix of the two; iii) other. Choosing the first option means that the model is implemented taking into account the footprint of the copper access network and/or the fibre network of the incumbent operator. The second option (municipality) means that the model considers an administrative area as a footprint for the access network (like postal codes).

The most frequent approach is the MDF/ODF area in line with the replies provided for the node location approach (scorched node/modified). It is relevant to consider that for an NGA network the footprint of the network may differ from the one used for modelling a copper based product. In the same figure, the number of Local central office considered is provided. The architecture taken into account for Local central office for LLU and VULA, where relevant, seems the same.

Figure 44 - Network architecture applied when a BU asset base is in use<sup>47</sup>

	M3a_201 4_M4_20 07_ULL	M3a_201 4_M4_20 07_SLU	M3a_201 4_M4_20 07_fiberU	M3a_201 4_M4_20 07_VULA (FTTC)	M3a_201 4_M4_20 07_VULA (FTTH)	M3a_201 4_M4_20 07_DF	M3a_201 4_M4_20 07_DA	M3b_201 4_legacy	M3b_201 4_NGA (including FTTC)	M3b_201 4_(FTTH)	M3b_201 4_(Cable docsis <3.0)	M3b_201 4_(Cable docsis >3.0)
MDF/ODF area	12	10	3	4	4	4	3	7	5	3	2	2
Municipal ity	0	0	0	0	0	0	1	0	0	0	0	0
Municipal ity/MDF- ODF area	1	1	0	0	0	1	1	0	0	0	0	0
Other	1	0	0	0	1	0	0	1	1	1	0	0

Number of central office for ULL	
AT	1400
BE	600
DE	7542
DK	1182
FR	8187
HR	348
IT	10000
LI	35
LU	106
SE	3122

Source: BEREC RA Database 2021

Figure 45 shows the technology used for modelling purposes. It is interesting to see that some NRAs that model an all FTTH network nevertheless apply price control for legacy products on the base of a fibre product (DE, ES, FR, SE, SI).

<sup>47</sup> The BU asset base is represented as a TD approach only where a scorched node approach in combination with MDF/ODF approach has been considered.

Figure 45 - Network technology applied

	M3a_201 4_M4_20 07_ULL	M3a_201 4_M4_20 07_SLU	M3a_201 4_M4_20 07_fiberU	M3a_201 4_M4_20 07_VULA (FTTC)	M3a_201 4_M4_20 07_VULA (FTTH)	M3a_201 4_M4_20 07_DF	M3a_201 4_M4_20 07_DA	M3b_201 4_legacy	M3b_201 4_NGA (including FTTC)	M3b_201 4_(FTTH)	M3b_201 4_(Cable docsis <3.0)	M3b_201 4_(Cable docsis >3.0)
FTTH	4	4	1	1	3	1	1	0	0	1	0	0
FTTE- FTTC- FTTH	3	3	2	1	1	2	1	1	2	2	1	1
FTTH- FTTC	1	1	0	1	1	2	1	1	1	0	0	0
FTTE-FTTC	0	0	0	1	0	0	0	0	1	0	0	0
FTTE	2	0	0	0	0	0	0	1	0	0	0	0
Other	2	1	0	0	0	0	1	2	1	1	1	1

	M3a_201 4_M4_20 07_ULL	M3a_201 4_M4_20 07_SLU	M3a_201 4_M4_20 07_fiberU	M3a_201 4_M4_20 07_VULA (FTTC)	M3a_201 4_M4_20 07_VULA (FTTH)	M3a_201 4_M4_20 07_DF	M3a_201 4_M4_20 07_DA	M3b_201 4_legacy	M3b_201 4_NGA (including FTTC)	M3b_201 4_(FTTH)	M3b_201 4_(Cable docsis <3.0)	M3b_201 4_(Cable docsis >3.0)
GPON/P2P	2	2	1	0	0	2	0	0	0	1	0	0
GPON	6	5	2	3	5	2	2	3	4	3	1	1
P2P	2	2	0	0	0	1	1	0	0	0	0	0

Source: BEREC RA Database 2021

### Coverage

Figure 46 summarises the coverage network estimation used for modelling purposes: i) forward looking; ii) as-is. The first option means that coverage is achieved in a forward looking way taking into account a medium term horizon with respect to the current situation; the second option considers that the coverage for network modelling purpose is taken as it is at the time of estimation of service costs. Most NRAs use a forward looking estimation, only for DF and Market 3b this approach is less frequent.

Figure 46 - Estimated network coverage

	M3a_201 4_M4_20 07_ULL	M3a_201 4_M4_20 07_SLU	M3a_201 4_M4_20 07_fiberU	M3a_201 4_M4_20 07_VULA (FTTC)	M3a_201 4_M4_20 07_VULA (FTTH)	M3a_201 4_M4_20 07_DF	M3a_201 4_M4_20 07_DA	M3b_201 4_legacy	M3b_201 4_NGA (including FTTC)	M3b_201 4_(FTTH)	M3b_201 4_(Cable docsis <3.0)	M3b_201 4_(Cable docsis >3.0)
Forward Looking	10	9	2	3	5	3	3	6	5	3	2	2
As is	1	0	1	0	0	2	0	1	0	1	0	0

Source: BEREC RA Database 2021

The approach used for the level of coverage from a geographical point of view (spatial domain) is reported in figure 47. Two options have been provided in the questionnaire: National and sub national. Most NRAs consider a “national” network coverage for modelling purposes in line with a forward looking estimation.

Figure 47 - Estimated geographical coverage

	M3a_201 4_M4_20 07_ULL	M3a_201 4_M4_20 07_SLU	M3a_201 4_M4_20 07_fiberU	M3a_201 4_M4_20 07_VULA (FTTC)	M3a_201 4_M4_20 07_VULA (FTTH)	M3a_201 4_M4_20 07_DF	M3a_201 4_M4_20 07_DA	M3b_201 4_legacy	M3b_201 4_NGA (including FTTC)	M3b_201 4_(FTTH)	M3b_201 4_(Cable docsis <3.0)	M3b_201 4_(Cable docsis >3.0)
<b>National</b>	13	10	2	3	4	4	4	7	5	2	1	1
<b>Sub national</b>	0	0	1	0	1	1	0	0	0	2	1	1

Source: BEREC RA Database 2021

Figure 48 includes elements of the main source of coverage for NGA modelling purposes for FTTH/FTTC. In the questionnaire 6 options were provided: i) SMP coverage; ii) OAO coverage; iii) SMP and OAO coverage iv) National and v) Sub national<sup>48</sup>. Most NRAs use SMP coverage in a forward looking way. In other cases a National coverage is used independently from other sources of information. When modelling a FTTH network for regulating ULL legacy product, the “national” option is the most frequent case.

Figure 48 - Source used as a base for NGA network coverage in modelling

	M3a_201 4_M4_20 07_ULL	M3a_201 4_M4_20 07_SLU	M3a_201 4_M4_20 07_fiberU	M3a_201 4_M4_20 07_VULA (FTTC)	M3a_201 4_M4_20 07_VULA (FTTH)	M3a_201 4_M4_20 07_DF	M3a_201 4_M4_20 07_DA	M3b_201 4_legacy	M3b_201 4_NGA (including FTTC)	M3b_201 4_(FTTH)	M3b_201 4_(Cable docsis <3.0)	M3b_201 4_(Cable docsis >3.0)
<b>SMP coverage</b>	7	5	1	1	2	1	1	4	2	2	1	1
<b>OAO coverage</b>	0	0	0	0	0	0	0	0	0	0	0	0
<b>SMP+OAO coverage</b>	1	1	0	1	1	2	2	0	1	0	0	0
<b>National</b>	5	4	2	1	2	2	1	3	2	2	1	1

Source: BEREC RA Database 2021

Figure 49 shows cost averaging: an average cost for the whole country or for a specific target area where regulation is in charge. The most part of the respondents consider an average price based on a national average, unless this situation is less frequent in case of FTTH product.

<sup>48</sup> Options iv and v are independent of effective coverage by operators (SMP or OAOs).

Figure 49 - Cost averaging<sup>49</sup>

	M3a_201 4_M4_20 07_ULL	M3a_201 4_M4_20 07_SLU	M3a_201 4_M4_20 07_fiberU	M3a_201 4_M4_20 07_VULA (FTTC)	M3a_201 4_M4_20 07_VULA (FTTH)	M3a_201 4_M4_20 07_DF	M3a_201 4_M4_20 07_DA	M3b_201 4_legacy	M3b_201 4_NGA (including FTTC)	M3b_201 4_(FTTH)	M3b_201 4_(Cable docsis <3.0)	M3b_201 4_(Cable docsis >3.0)
<b>National average</b>	16	10	3	3	4	4	7	9	7	4	1	1
<b>Target areas where regulation is in charge</b>	1	1	2	0	1	1	0	1	1	3	1	1

Source: BEREC RA Database 2021

In the following table legacy ULL services and adopted costing methodology is shown. The reported price bands have been evaluated considering a compound inflation rate from 2014 until 2020 (HIPC) for each country.<sup>50</sup>

<sup>49</sup> Differently from the previous table in this case all replies have been considered independently if the model has a BU or TD asset base.

<sup>50</sup> <https://ec.europa.eu/eurostat/databrowser/view/tec00118/default/table?lang=en>. The compound inflation rate is considering the time window 2014 -2020. Where not available, the EU (27) compound inflation rate has been considered. The low and high value of the price band have been evaluated as  $8-10 \cdot (1 + \text{inflation rate}_{2014}) \cdot (1 + \text{inflation rate}_{2015}) \cdot \dots \cdot (1 + \text{inflation rate}_{2020})$ .

Figure 50 - LLU monthly fee and costing methodology/ price band

ULL costing methodology												
Country	ULL Price (Euro)	Price control	Price control sub category	Main	Sub category accounting method	Cost base	Implementation of Recommendation (30-37)	Implementation of Recommendation (40)	Reusable civil infrastructure	Low Price band	High Price band	compound Inflation rate 2014-2020
FI	13.75	Cost_Orientation	Cost orientation alone	FDC	0	CCA	0	0	0	8.40	10.50	5.00%
LI	13.3	Cost_Orientation	Cost orientation alone	FDC	0	HCA	0	Yes	0	8.51	10.64	6.35%
IE	11.52	Cost_Orientation	0	LR_A_IC	0	CCA	Yes	No	Yes	8.12	10.15	1.50%
DE	11.19	Cost_Orientation	Cost orientation alone	LR_A_IC	TD-LR(A)IC+	CCA	Yes	No	Yes	8.60	10.75	7.52%
DK	9.77	Cost_Orientation	Price cap alone	LR_A_IC	BU-LR(A)IC+	CCA	Yes	0	No	8.28	10.34	3.45%
FR	9.65	Cost_Orientation	Price cap alone	LR_A_IC	BU-LR(A)IC+	CCA	Yes	No	Yes	8.50	10.62	6.25%
SE	9.58	Cost_Orientation	Price cap alone	LRIC	BU-LRIC	CCA	Yes	No	Yes	8.69	10.86	8.59%
PT	8.99	Cost_Orientation	Cost orientation alone				0	0	0	8.32	10.40	3.95%
IT	8.9	Cost_Orientation	Cost orientation alone	LR_A_IC	BU-LR(A)IC+	CCA	Yes	0	Yes	8.26	10.32	3.23%
CY	8.7	Cost_Orientation	Cost orientation alone	LRIC	BU-LRIC	CCA	Yes	No	Yes	7.83	9.79	-2.11%
ES	8.6	Cost_Orientation	Cost orientation alone	LRIC	BU-LRIC	CCA	Yes	No	Yes	8.25	10.31	3.11%
LU	8.54	Cost_Orientation	Price cap alone	LRIC	BU-LRIC	CCA	Yes	No	Yes	8.53	10.67	6.66%
SI	8.09	Cost_Orientation	Cost orientation alone	LRIC	BU-LRIC	CCA	Yes	No	Yes	8.35	10.43	4.34%
BE	8.03	Cost_Orientation	Cost orientation alone	LR_A_IC	BU-LR(A)IC+	CCA	0	0	0	8.75	10.93	9.33%
NO	7.45	Cost_Orientation	Price cap alone	LR_A_IC	BU-LR(A)IC+	HCA	No	No	Yes	9.39	11.73	17.34%
EL	7.36	Cost_Orientation	Cost orientation alone	LR_A_IC	BU-LR(A)IC+	CCA	Yes	No	Yes	7.89	9.86	-1.42%
AT	7.26	Others/Combination		LR_A_IC	BU-LR(A)IC+	CCA	Yes	No	0	8.88	11.10	10.98%
CZ	6.85	Others/Combination					No	No	Yes	8.97	11.21	12.15%
HR	5.36	Cost_Orientation	Price cap alone	LR_A_IC	BU-LR(A)IC+	CCA	Yes	0	Yes	8.24	10.30	3.02%

RS	5.35	Cost_Orientation	Cost orientation alone	FDC	0	CCA	No	Yes	No	9.20	11.50	14.97%
EE	4.94						No	Yes	No	8.85	11.06	10.57%
HU	4.51	Cost_Orientation	Cost orientation alone	LR_A_IC	BU-LR(A)IC+	CCA	Yes	No	Yes	9.06	11.32	13.22%
SK	4.2						No	No	Yes	8.64	10.80	8.00%
LT	2.8	Cost_Orientation	Cost orientation alone	FDC	0	HCA	0	0	0	8.80	11.00	10.04%
ME		Cost_Orientation	0	0	0	CCA	0	0	0	8.51	10.64	6.35%
LV		Cost_Orientation	Cost orientation alone	FDC	0	CCA	No	Yes	No	8.77	10.96	9.62%
MT		Cost_Orientation	Cost orientation alone	FDC	0	HCA	0	0	0	8.68	10.85	8.49%
PL		Cost_Orientation	Cost orientation alone	LR_A_IC	TD-LR(A)IC+	CCA	No	Yes	Yes	8.64	10.80	7.99%



## 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 may 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) 171). However, it should be pointed out that there are a number of other important factors that may influence NRA regulation, i. e. national broadband strategy, national competitive challenges and country specific consumer behaviour.

A total of 32 NRAs<sup>51</sup> have provided data for this section. If data is confidential and can therefore not be shown in the analysis or if it has specificities, this will be shown in the footnotes.

The following structural data have been collected (data as at 1<sup>st</sup> April 2021 – unless otherwise indicated in the footnotes):

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<sup>51</sup> Austria (AT), Belgium (BE), Bulgaria (BG), Cyprus (CY), Czechia (CZ), Germany (DE), Denmark (DK), Estonia (EE), Greece (EL), Spain (ES), Finland (FI), France (FR), Croatia (HR), Hungary (HU), Ireland (IE), Italy (IT), Liechtenstein (LI), Lithuania (LT), Luxemburg (LU), Latvia (LV), Montenegro (ME), Malta (MT), Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Romania (RO), Republic of Serbia (RS), Sweden (SE), Slovenia (SI), Slovakia (SK), Kosovo\* (XK)\*. \*All references to Kosovo in this document should be understood to be in the context of the United Nations Security Council Resolution 1244 (1999). No data has been provided in 2021 by: Albania (AL), Iceland (IS), North Macedonia (MK), Turkey (TR).

Table 1 - Structural Data collected

<b>1</b>	<b>Population and population density</b>
1.1	Number of inhabitants
1.1a	Number of private households
1.1b	Number of households per population
1.2	Population density (number of inhabitants per sqkm)
1.2a	Metro population density
1.2b	Non-metro population density
1.3	Household connectivity
<b>2</b>	<b>Market situation</b>
2.1	Mobile broadband penetration (subscription as % of the total population)
2.2	Fixed broadband penetration (subscription as a % of the total households)
2.2.1	Technology share: % of (V)DSL
2.2.2	Technology share: % of cable (coax, HFC)
2.2.3	Technology share: % of FTTx
2.2.4	Technology share: % of other technologies (i.e. satellite, BWA etc.)
<b>3</b>	<b>Market share SMP operator / competitors</b>
3.1	Share of fixed broadband subscriptions
3.1.1	SMP operator
3.1.2	Competitors
3.2	Share of DSL broadband subscriptions legacy broadband
3.2.1	SMP operator
3.2.2	Competitors
3.2.3	Cable operators
3.3	Share of NGA (FTTB/C) broadband subscriptions
3.3.1	SMP operator
3.3.2	Competitors
3.3.3	Cable operators
3.4	Share of NGA (FTTH) broadband subscriptions
3.4.1	SMP operator
3.4.2	Competitors
3.4.3	Cable operators
3.5	FTTx/cable coverage on own infrastructure
3.5.1	SMP FTTB/C (via SLU) coverage (total coverage if more than one operator is present)
3.5.2	SMP FTTH BB coverage (total coverage if more than one operator is present)
3.5.3	SMP cable coverage (total coverage if more than one operator is present)
3.5.4	Other access operator(s) own infrastructure (including third party civil infrastructure) vertical integrated operator FTTB/C (via SLU) BB coverage (total coverage if more than one operator is present)
3.5.5	Other access operator(s) own infrastructure (including third party civil infrastructure) vertical integrated operator FTTH BB coverage (total coverage if more than one operator is present)
3.5.6	Other access operator(s) own infrastructure (including third party civil infrastructure) cable coverage (total coverage if more than one operator is present)
3.6	Other access operator(s) using third party infrastructure
3.6.1	Wholesale only other access operator(s) FTTH coverage (total coverage if more than one operator is present)

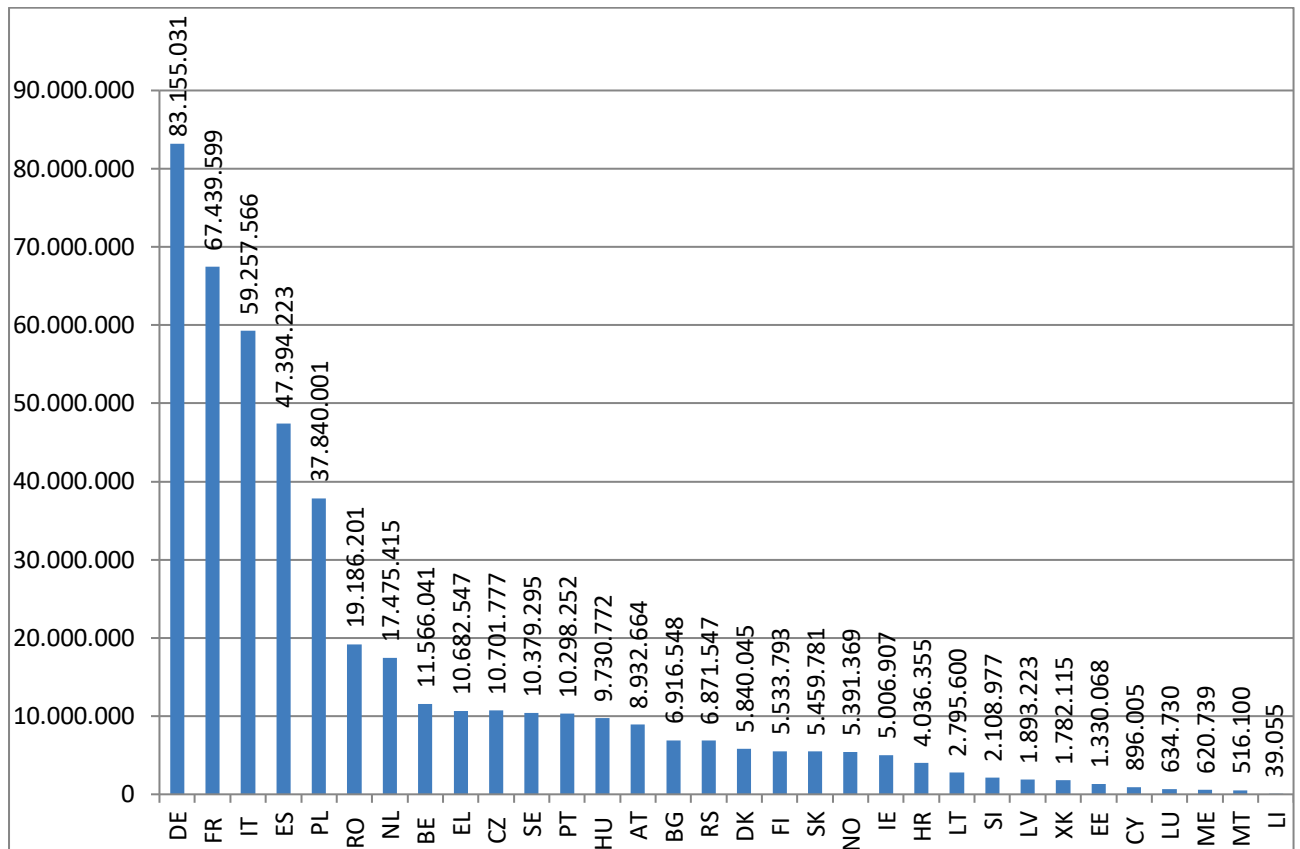
The data for *4.1 Population and Population Density* in number 1 is sourced from the Eurostat database. The data for *Market and Competitive Situation* and *Market Shares (Broadband)* in number 2 and 3 is sourced from participating NRAs. In addition Eurostat data on Household Connectivity is shown for households and businesses.

## 4.1 Population and Population Density

The data, which is naturally static and remains largely unchanged in comparison to previous years, can have a considerable influence on the cost of telecommunications infrastructure. For instance: 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**<sup>52</sup> (i. e. the total number of inhabitants per country) the top countries are Germany, France, Italy, Spain and Poland.

Figure 51 - Total Population

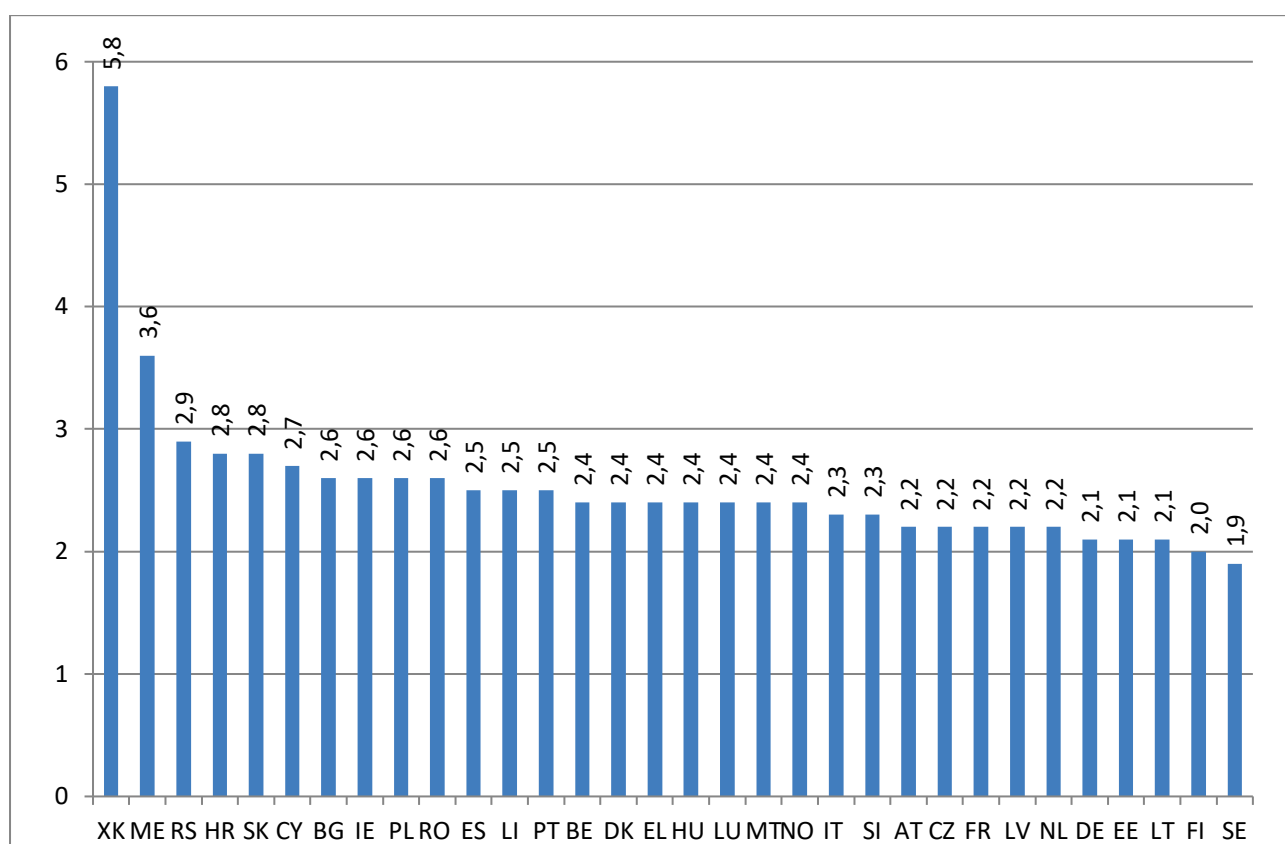


Source: Eurostat 2021

<sup>52</sup> Eurostat "Population on 1<sup>st</sup> January 2021" online data code: TPS00001. Provisional data for BE, FR, IT, ES, CY, LI. Estimate for EL, RO. Jan 2020 Data for XK

In relation to the total population, there are between two and three households in every country (except for Kosovo\*), calculated from the total number of households in each country<sup>53</sup>. The number is used in this report to calculate the fixed broadband penetration, shown per household.

Figure 52 - Number of Private Households (per total population)

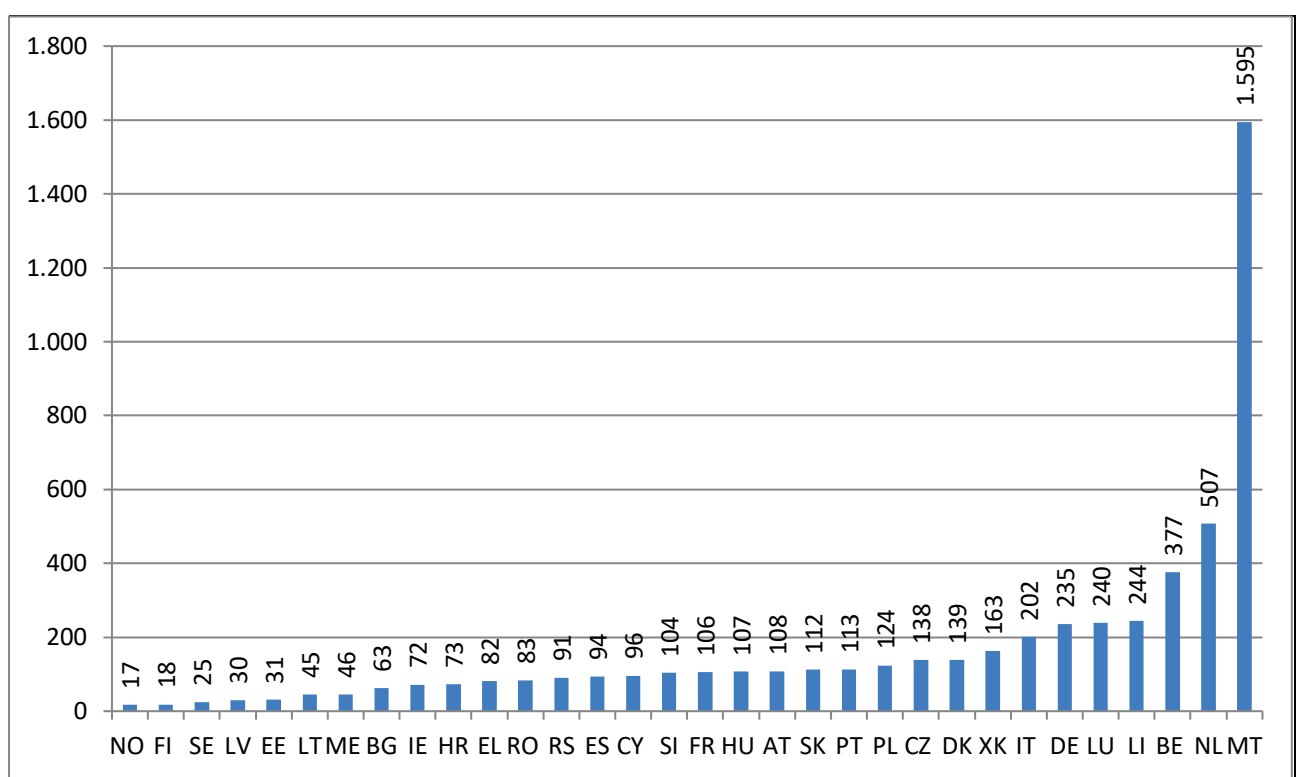


Source: Eurostat 2020

<sup>53</sup> Eurostat 2020 "number of private households", online data code: LFST\_HHWHHTC. XK: 5,8 households; based on figures provided by Michael Bauer Research 2019, <https://www.arcgis.com/home/item.html?id=1381436c32524e76b32152e191772fe8>

In terms of **population density**<sup>54</sup> (i. e. the number of inhabitants per square kilometre) the top countries with above 200 people per square km are Malta, the Netherlands, Belgium, Liechtenstein, Luxembourg, Germany and Italy.

Figure 53 - Population Density

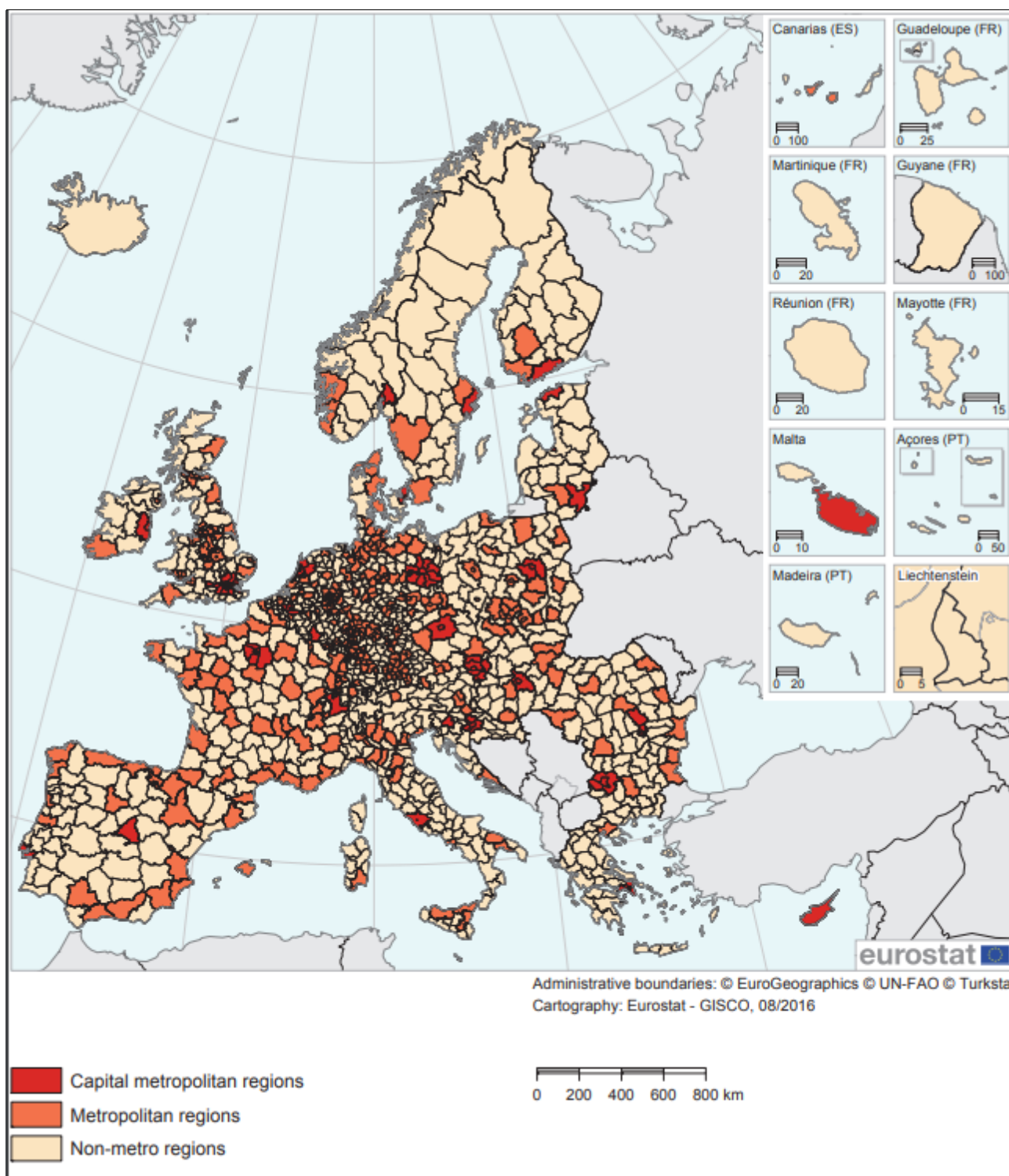


Source: Eurostat 2020

When looking at the **metro and non-metro population density**, an impression is given of the different effort and cost required by operators to provide infrastructure access to the population in metro and country areas.

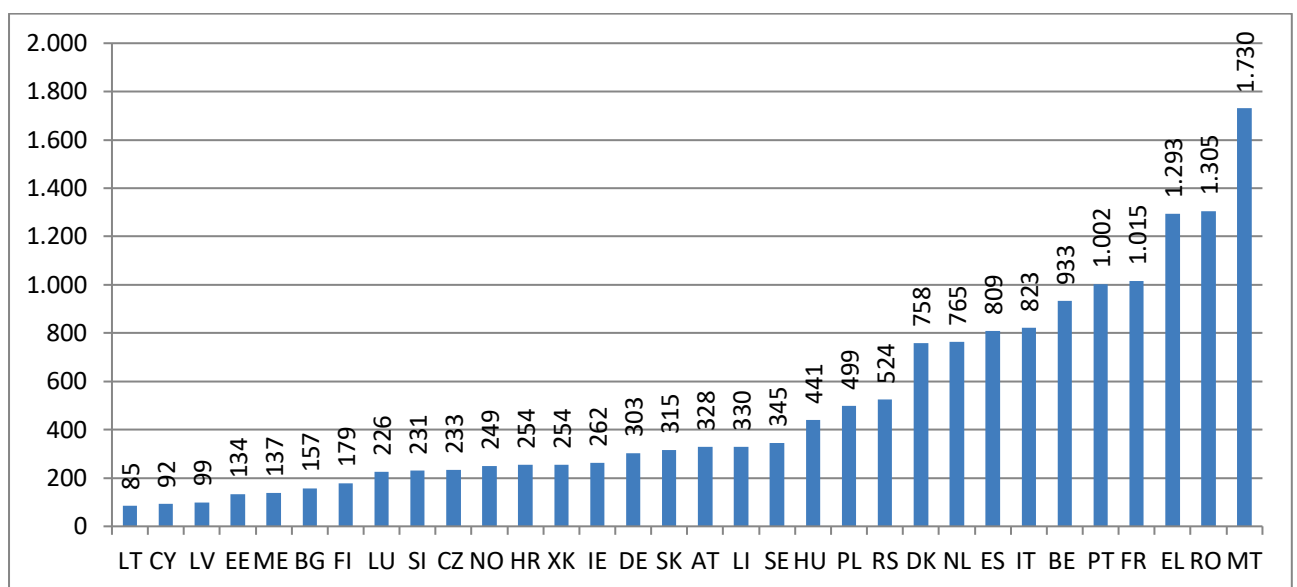
<sup>54</sup> Eurostat 2021 "Population density" online data code: TPS00003. XK: data is calculated based on 10.905,25 sqkm (data source: Statistical Office of Kosovo\* "Kosovo\* in Figures 2018")

Figure 54 - Metro and Non-metro Regions in the EU/EFTA



The population density in the capital city metro area<sup>55</sup> (usually, but not always, the most densely populated area of the country) is highest in Valetta (MT), Bucharest (RO), Athens (EL), Paris (FR) and Lisbon (PT).

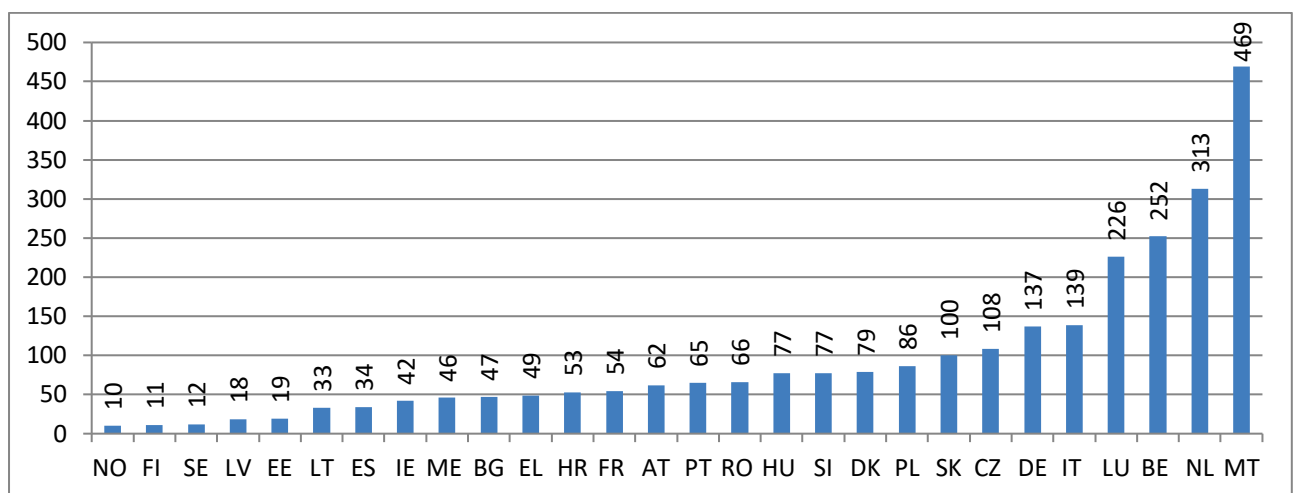
Figure 55 - Metro Population Density



Source: Eurostat 2016

The non-metro population density<sup>56</sup> shows the Northern Scandinavian (NO, FI, SE) and Baltic countries (LV, EE, LT) to have the least densely populated country side.

Figure 56 - Non-Metro Population Density



Source: Eurostat 2016

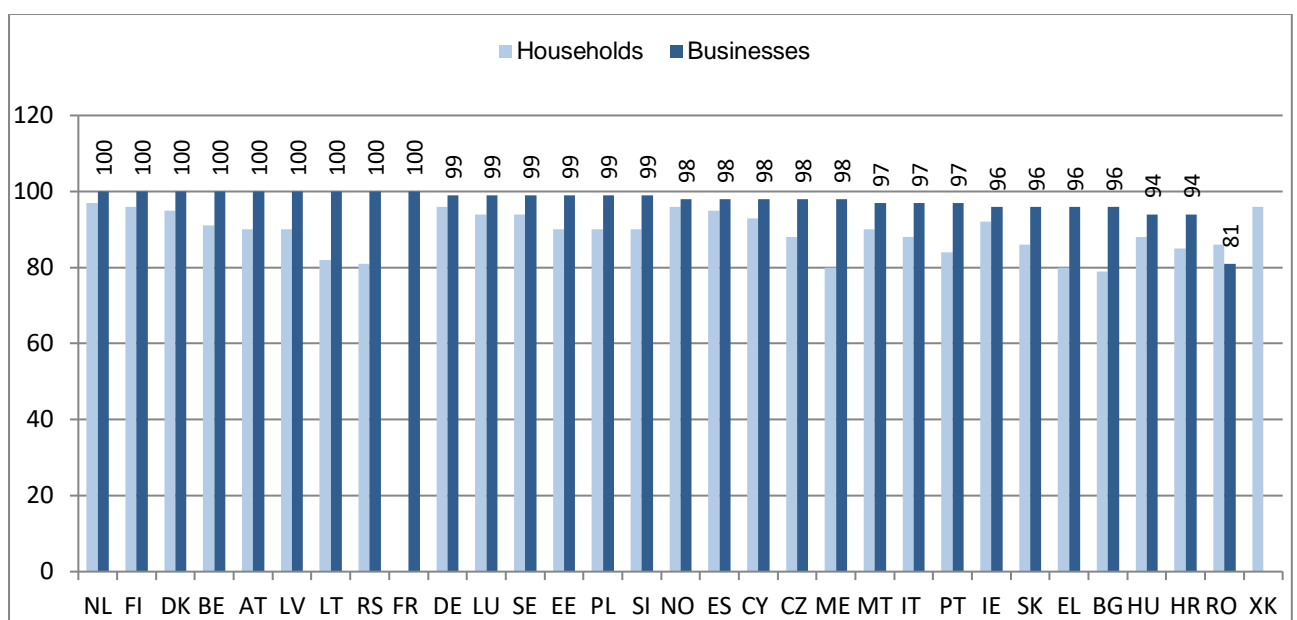
<sup>55</sup> Eurostat 2016 "Population density by metropolitan regions", online data code: MET\_D3DENS. Eurostat metro-regions are based on agglomerations, which include the commuter belt around a city. AT: Vienna, BE: Brussels, BG: Sofia, CY: Nicosia, CZ: Prague, DE: Berlin, DK: Copenhagen, EE: Tallinn, EL: Athens, ES: Madrid, FI: Helsinki, FR: Paris, HR: Za-

## 4.2 Household Connectivity

This section has been added to illustrate each country's current situation with regard to Internet access<sup>57</sup>, mobile and fixed broadband<sup>58</sup> available/used, as recorded by Eurostat.

Close to 100 % of businesses and at least 80-90 % of households have access to the Internet in every country.

Figure 57 - Internet Access (in %)



Source: Eurostat 2020

Fixed broadband Internet access is available to at least around 60 % of households in all countries, however there is still room for improvement concerning mobile broadband access.

greb, HU: Budapest, IE: Dublin, IT: Rome, LI: Vaduz, LT: Vilnius, LU: Luxembourg, LV: Riga, ME: Podgorica, MT: Valletta, NL: Amsterdam, NO: Oslo, PL: Warsaw, PT: Lisbon, RO: Bucharest, RS: Belgrade (Source: Statistical Office of the Republic of Serbia), SE: Stockholm, SI: Ljubljana, SK: Bratislava, XK: Pristina (Source: Wikipedia).

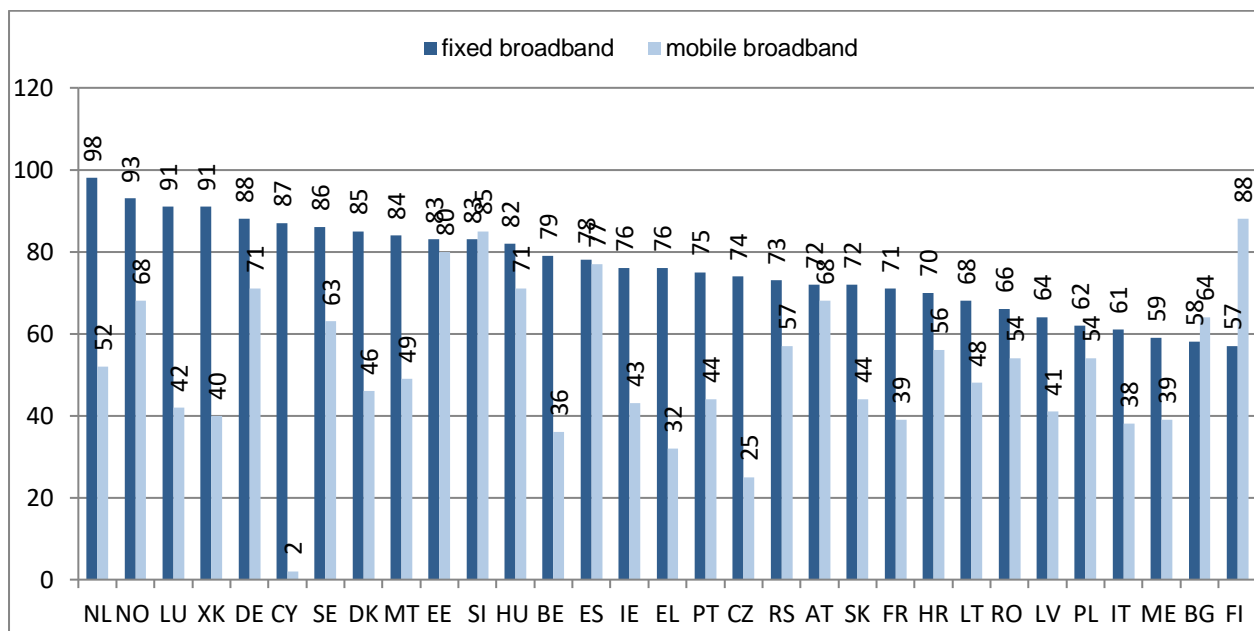
<sup>56</sup> Eurostat 2016 "Population density by metropolitan regions", online data code: MET\_D3DENS. Not available for CY, LI, LU, RS, XK.

<sup>57</sup> Eurostat 2019/2020, "Level of Internet Access: households" online data code: TIN00134, "Internet Access: businesses" online data code: ISOC\_CI\_IN\_EN2. Business data not available for XK No household data available for FR.

<sup>58</sup> Eurostat 2020 "Household Internet connection type: fixed/mobile broadband (per household)" online data code: ISOC\_BDE15B\_H\_\_custom\_1256100. No data available for LI.



Figure 58 - Fixed and Mobile Broadband (in %)



Source: Eurostat 2020

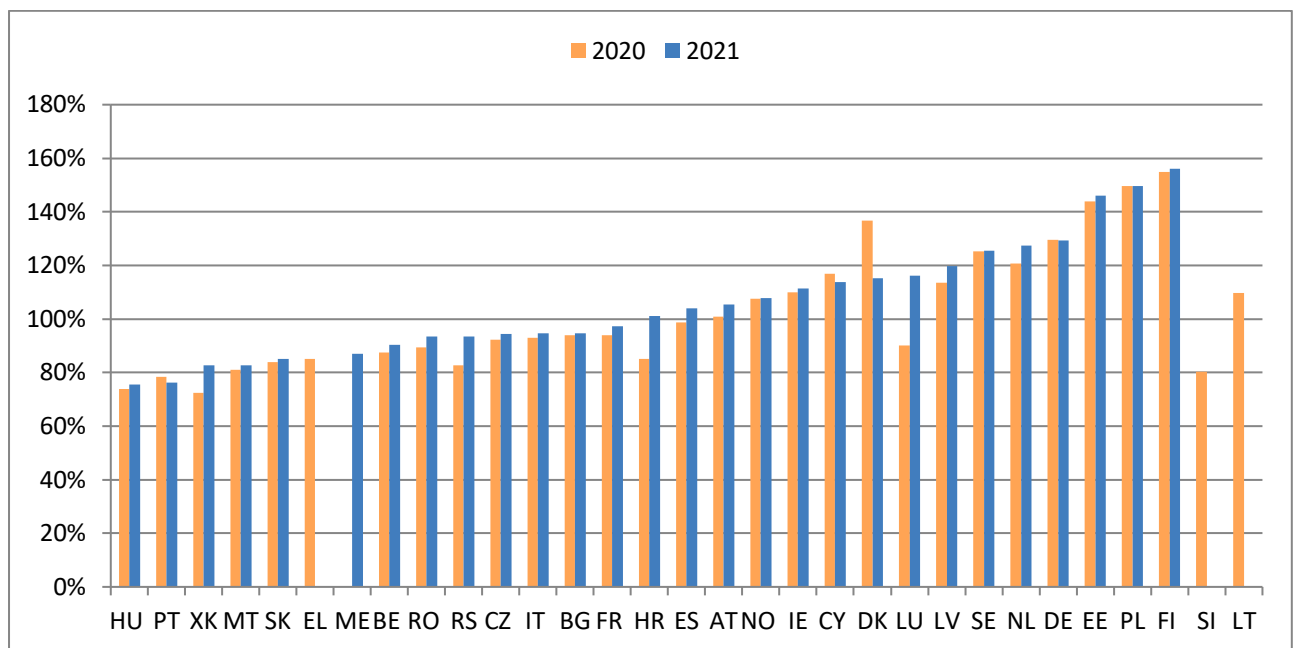
### 4.3 Market and Competitive Situation

The market and competitive situation within the different countries, which has a direct influence on the regulatory regime, shows considerable disparity. The data in this section has been provided by NRAs<sup>59</sup>.

Concurrent with the last reports, this report focusses on the increasingly important broadband usage rather than subscriptions to classical fixed and mobile telephones, which are also depicted in other reports<sup>60</sup>.

The **mobile broadband penetration**, represents mobile broadband end users as a percentage of the total population<sup>61</sup> (excluding M2M). Percentages are only shown for 2021. They range between 76 per cent in the Hungary and 156 per cent in Finland. The countries with a mobile broadband penetration rate in 2021 of around or more than 100 per cent are Croatia, Spain, Austria, Norway, Ireland, Cyprus, Denmark, Luxemburg, Latvia, Sweden, Netherlands, Germany, Estonia, Poland and Finland. Shown in comparison is the penetration rate (as a percentage of the total population) in 2020. On the whole, mobile broadband penetration is slowly on the increase.

Figure 59 - Mobile Broadband Penetration (per total population)



Source: BEREC RA database 2021

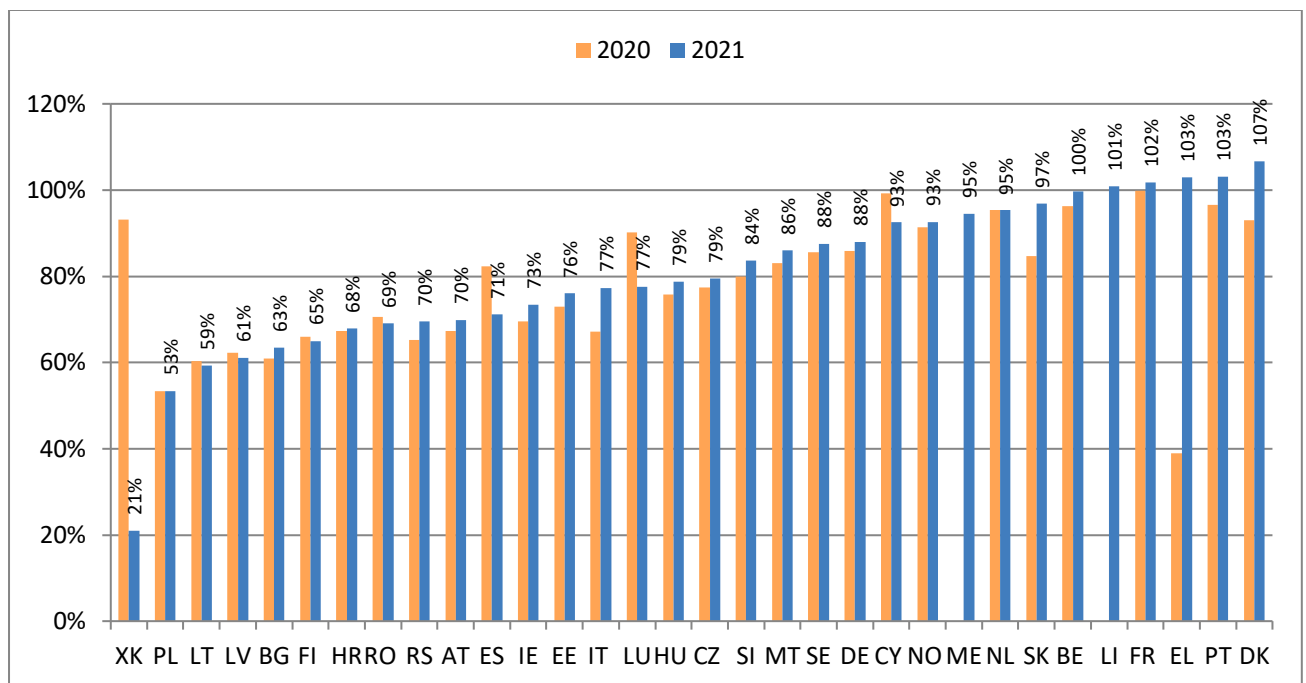
<sup>59</sup> PL: no updated data available (data is the same as previous year's), EL: latest available data as of year end 2020 (no significant difference has been observed in comparison to the first quarter 2021) .

<sup>60</sup> i. e. BEREC Report on European Termination Rates

<sup>61</sup> AT: mobile BB incl. Smartphone tariffs. CZ: excl. LTE access provided in fixed locations. SI, EL, BE, LT: no data available for 2021. ME: no data available.

The *fixed broadband penetration*<sup>62</sup> represents fixed broadband subscriptions as a percentage of the total number of households. Percentages are only shown for 2021 and vary between 21 per cent in Kosovo\* and 107 per cent in Denmark. Shown in comparison is the penetration rate in 2020. Fixed broadband penetration has slightly increased in comparison to the previous year in most countries.

Figure 60 - Fixed Broadband Penetration (per household)



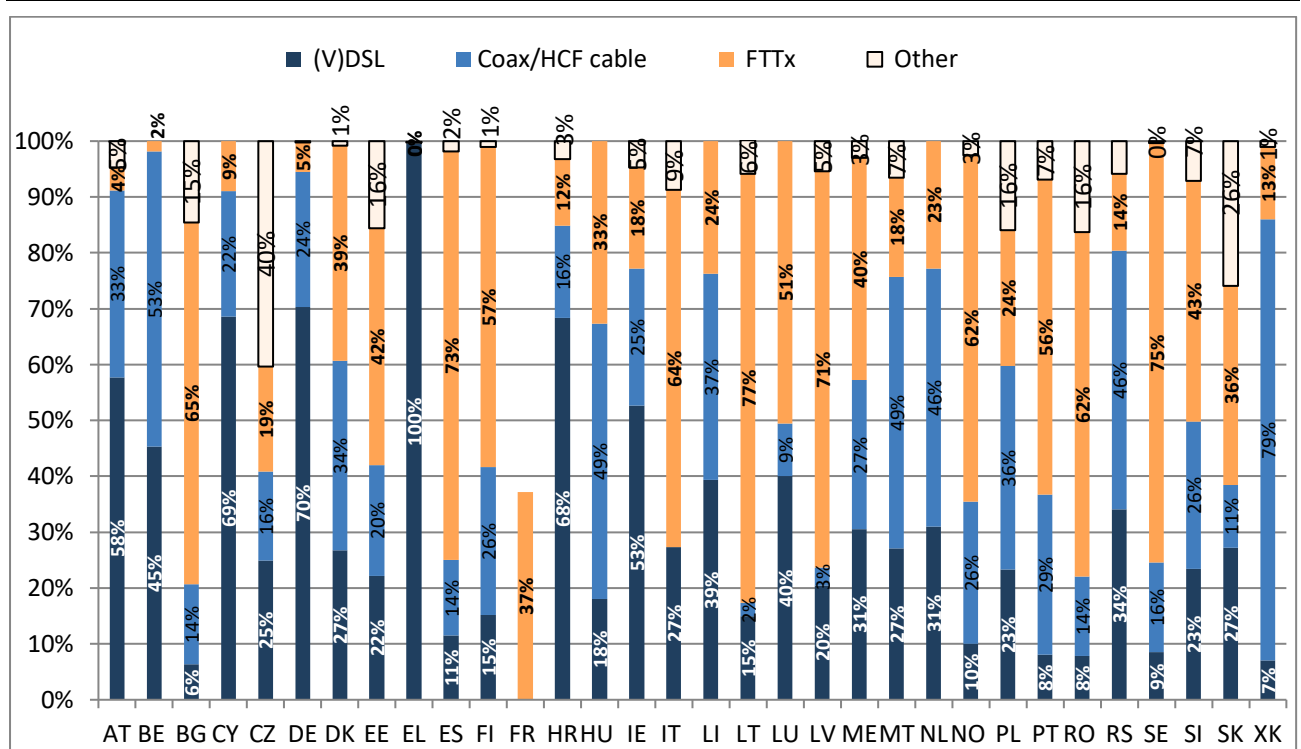
Source: BEREC RA database 2021

<sup>62</sup> FI: fixed BB only household subscriptions. FR: includes business fixed BB subscriptions. HU: only fixed w/o mobile 4G. MT: without business (13,14%). PT: non-residential incl. RO: incl. SIM based. EL, RS, BE: no data available for 2021. ME: no data available. ES: in 2021 only residential lines were taken into account. If non-residential were to be included (as in 2020), the percentage would be 84,98%.

The following table shows the percentage share of fixed broadband technology<sup>63</sup>:

- (V)DSL lines (including ADSL, naked DSL, VDSL)
- Cable (via coax, hybrid fibre coax cable HFC)
- FTTx (via FTTH, FTTB/C)<sup>64</sup>
- Other technologies (broadband wireless access BWA, satellite, fixed LTE etc.)

Figure 61 - Technology Share of Fixed Broadband



Source: BEREC RA database 2021

**(V)DSL lines** as a percentage of fixed broadband range from just over 7 percent in Bulgaria to 99 percent in Greece. The countries with a share higher than 50 per cent are – unchanged from last year - Ireland, Austria, Croatia, Germany and Cyprus.

**Cable** as a percentage of fixed broadband (no cable coverage in Italy) range from 3 per cent in Lithuania to over 50 per cent in Hungary, Belgium and the Kosovo\*.

The use of **FTTx** technology is very low in Greece, Austria, Belgium, Cyprus and Germany. A share of at least 50 per cent is recorded for Luxemburg, Portugal, Finland, Romania, Norway, Italy, Bulgaria, Latvia, Spain, Sweden and Lithuania.

**Other** technologies reported by some countries may include satellite, fixed wireless access (FWA), fixed LTE etc. These seem to be on the increase and may receive more focus in future reports. Czechia has the highest share with over 40 per cent. Bulgaria, Romania, Poland, Slovakia and Estonia record shares between 14 and 26 per cent.

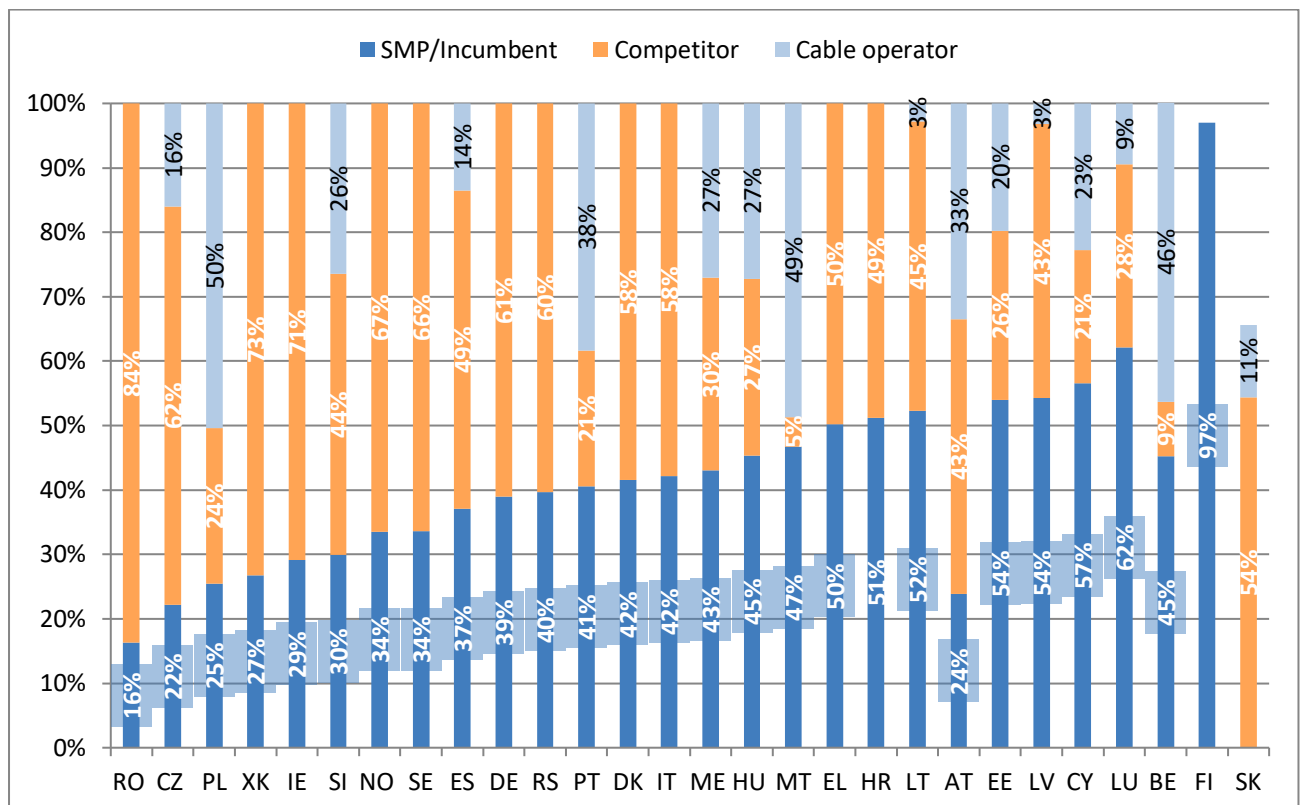
<sup>63</sup> FR: confidential (except FTTx). CZ: "Other" incl. fixed wireless access (FWA) and also LTE access at fixed location. MT: incl. residential and business. RO: VDSL incl. xDSL+fibre. FTTx excl. HFC and DSL+fibre. ME: no data available.

<sup>64</sup> FTTx = fibre to "x" connection, i.e. FTTH = fibre to the home, FTTB/C = fibre to the building/curb

## 4.4 Market Shares (Broadband)

This section looks at the market and competitive situation in the increasingly important broadband market, i. e. the market shares of the SMP(s) vs. the market shares of alternative operators (OAO other access operators/competitors) as well as cable operators. This includes DSL and NGA (FTTx) broadband users. The data analysis shows a considerable disparity in market shares and therefore points to differences in the national competitive situation, thereby affecting regulatory strategy.

Figure 62 - Fixed Broadband Market Share



Source: BEREC RA database 2021

The **fixed broadband** market share is split into:

- Share of the SMP(s)/Incumbent operator(s): in some countries, they also operate cable, thus total SMP shares cannot be portrayed correctly for these countries<sup>65</sup>. The share ranges from a minimum of 16 per cent in Romania to 97 per cent in Finland. The SMP has a market share of greater than 50 per cent in Greece, Croatia, Lithuania, Estonia, Cyprus, Latvia, Luxemburg and Finland.
- Share of competitors: market shares range from 5 per cent in Malta to over 80 per cent in Romania. In some countries, competitor data includes cable, which makes shares difficult to compare with countries that record shares separately<sup>66</sup>.

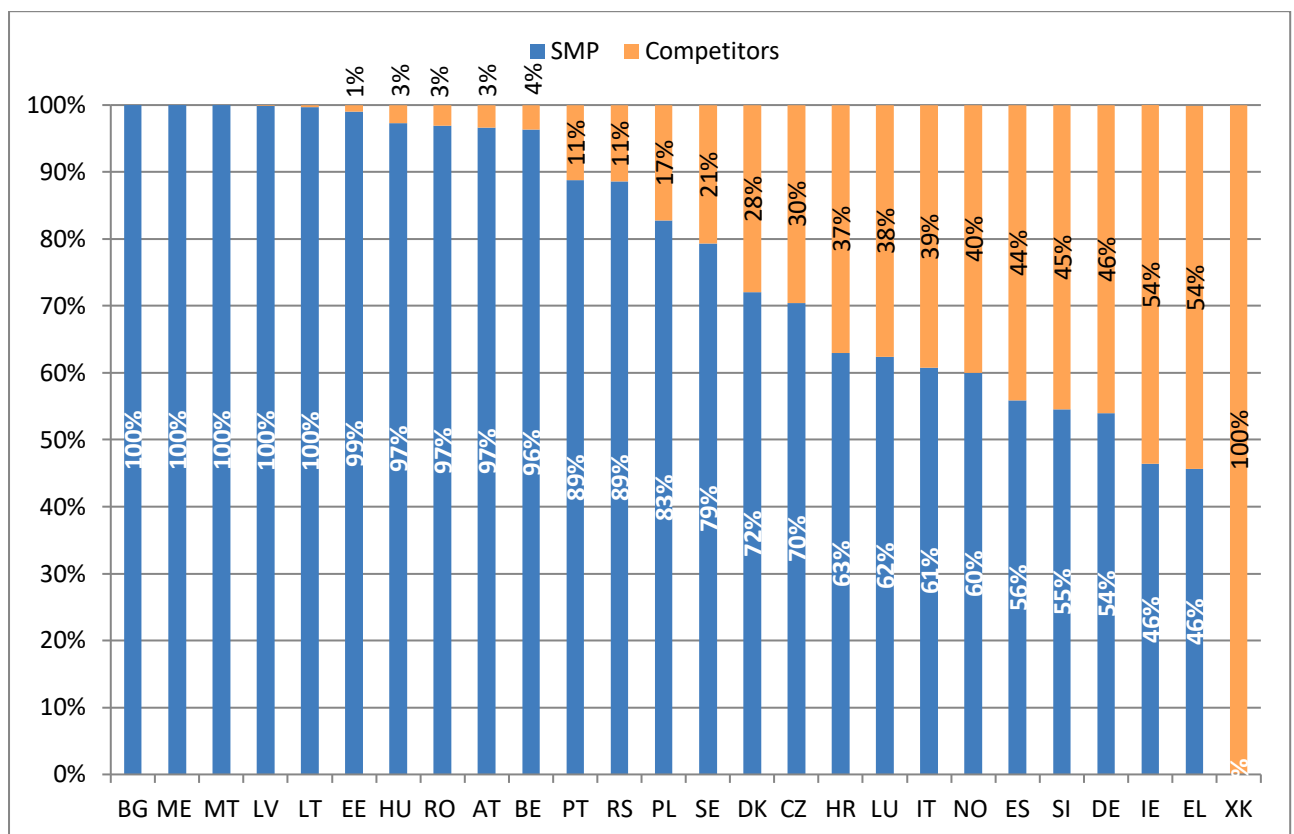
<sup>65</sup> Data is confidential in BG, FR, LI, NL, and SK. PL: the biggest operator's share. RO: the incumbent is not SMP. AT, BE: cable operators are SMP operators as well.

<sup>66</sup> Competitors include cable operators in HR, IE, NO, RS. Data is confidential in BG, FR, LI, NL.

- Share of cable operators: not all NRAs record data/record data separately from competitor data<sup>67</sup>. Where it is recorded separately shares range from around 3 per cent in Lithuania/Latvia to over 50 per cent in Poland.

The **DSL broadband** share (including docsis prior to 3.0, excluding VDSL)<sup>68</sup> is the traditional domain of SMP/incumbent operators. Their market share ranges from a 46 per cent in Greece to 100 per cent in Latvia, Lithuania, Malta, Montenegro and Bulgaria (only the SMP operator offers DSL). Shown in the same figure are competitor market shares, ranging from around 1 per cent in Estonia to 100 per cent in Kosovo\*.

Figure 63 - DSL Broadband Market Share



Source: BEREC RA database 2021

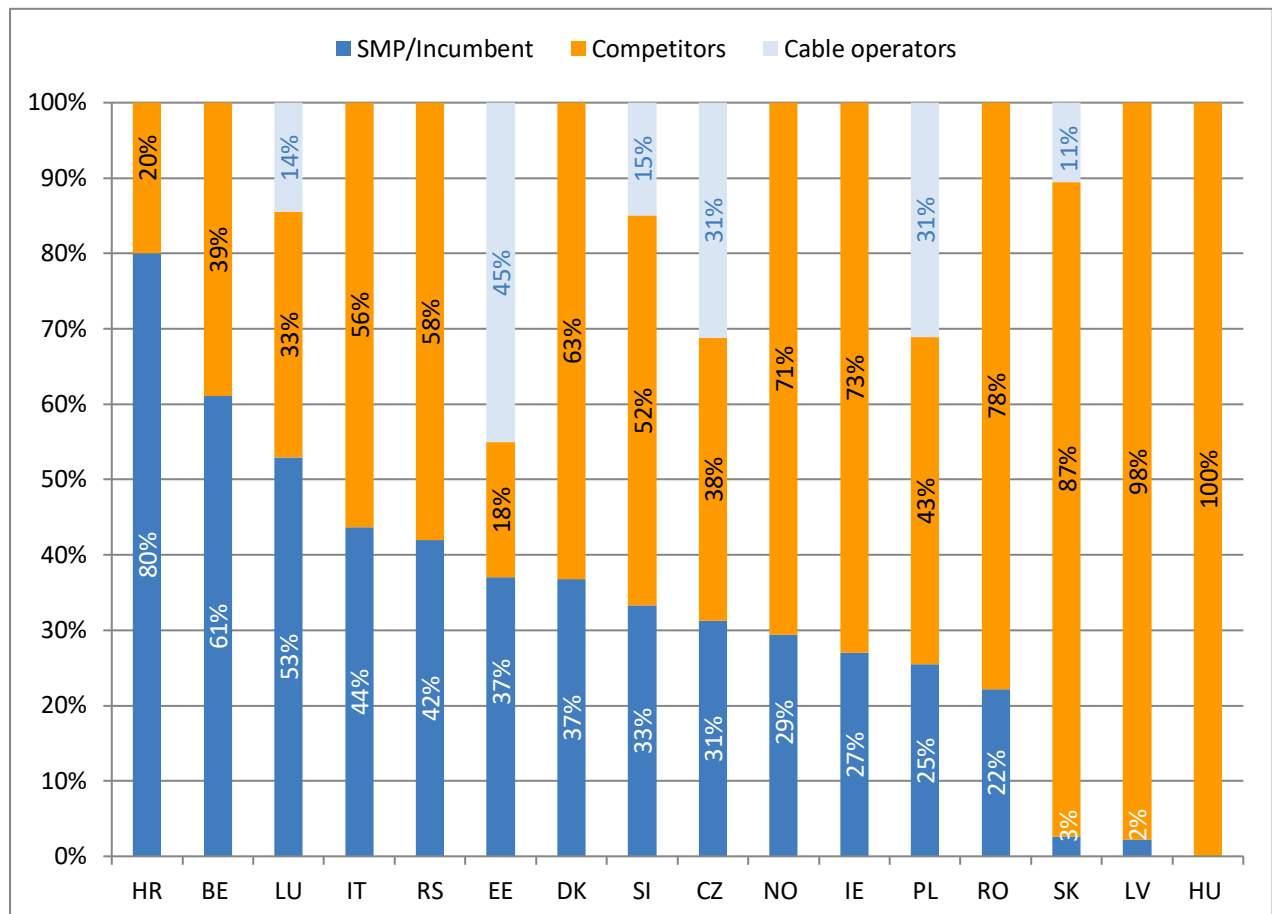
<sup>67</sup> In BE, HR, IE, NO, RO, XK, cable is included in SMP and/or competitor data (and cannot be separately provided). DE: cable share is not known (not regulated). No cable coverage in IT. DK: SMP is also the biggest cable operator. HU: 1/3 of cable is SMP, 2/3 competitors. PT: Cable operators also provide fixed BB access over DSL, FTTH and Other technologies (included in cable). Data is confidential in BG, FR, LI, NL

<sup>68</sup> Data is confidential in FR, LI, NL, and SK. No data in CY, FI. IE: Eircom DSL/Total DSL. PL: The biggest operator's share (Orange Polska). RO: Market share of the incumbent (incumbent is not SMP). PT: cable operators also provide fixed BB access over DSL.

Due to the growing relevance of NGA and corresponding with questions concerning “coverage on own network”, question on FTTx have been split into FTTC/B and FTTH.

Looking at **NGA (FTTB/C) broadband** share,<sup>69</sup> the SMP/Incumbent’s share ranges from 2 per cent in Latvia to 97 per cent in the Republic of Serbia. Shown in the same figure are competitor’s and cable operator’s market shares<sup>70</sup>.

Figure 64 - FTTB/C Broadband Market Share



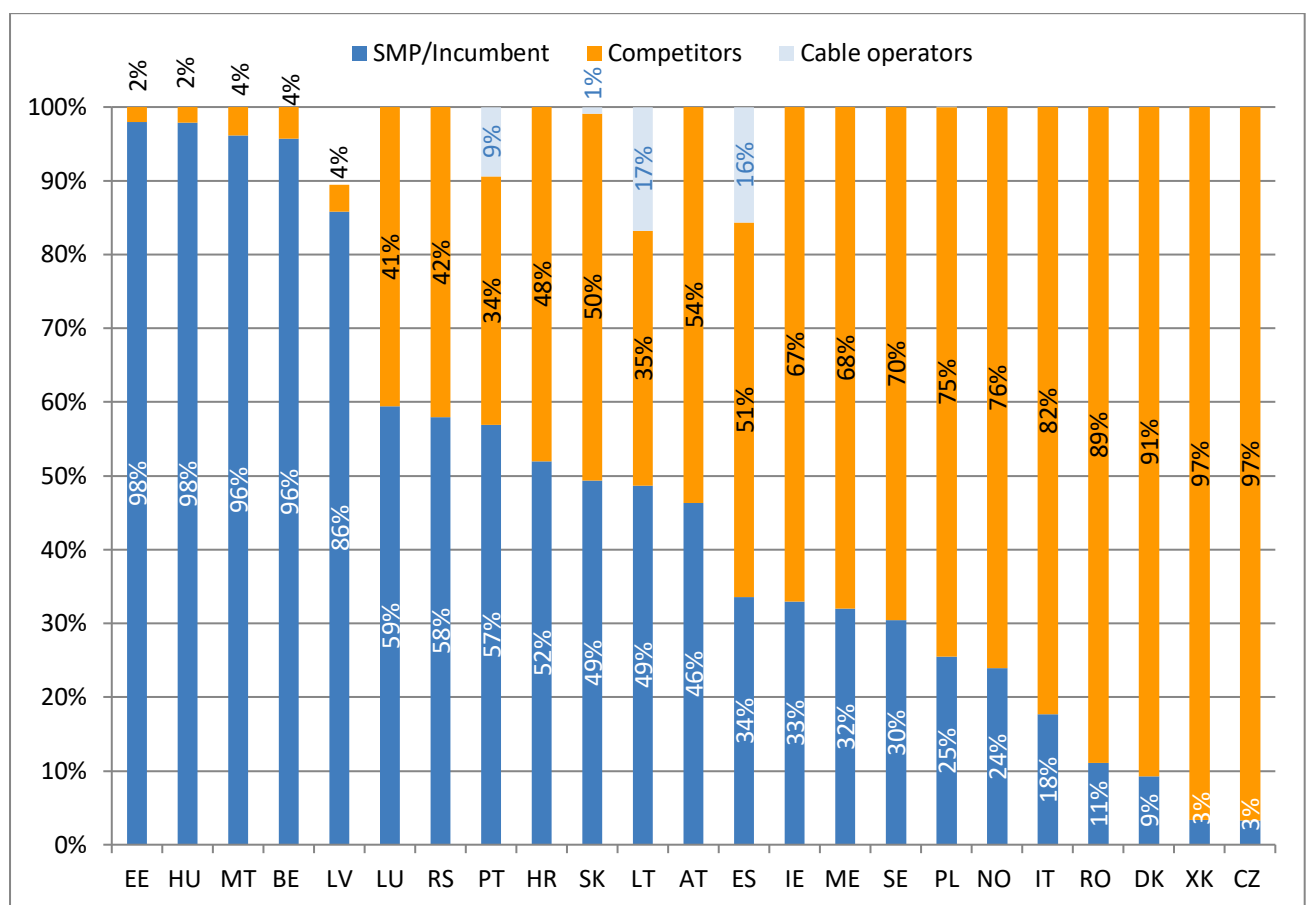
Source: BEREC RA database 2021

<sup>69</sup> Data is confidential in BG, CY and not available in AT, DE (FTTB/C and FTTH not recorded separately), EL, ES, FI, FR, LI, LT, ME, MT, NL, PT, SE, XK. IE: Eircom VDSL/Total VDSL+cable. RO: FTTN included. Incumbent is not SMP. PL: biggest operator’s share (Orange Polska).

<sup>70</sup> Data is confidential in BG, CY and not available in AT, DE, EL, ES, FI, FR, LI, LT, ME, MT, NL, PT, SE, XK. DK: SMP = biggest cable operator. CZ: SMP operator’s share on total NGA subscriptions (VDSL, FTTH/B and CATV). FTTC represented by all VDSL subscriptions, competitor’s share on all VDSL, FTTH/B and CATV subscriptions, cable operator’s share of CATV competitors on all VDSL, FTTH/B and CATV subscriptions. In BE, HR, IE, NO, RO, RS: cable operators are included in competitor’s share.

Regarding **NGA (FTTH) broadband** share,<sup>71</sup> the SMP/Incumbent's share ranges from 3 per cent in Czechia and Kosovo\* to 98 per cent in Estonia. Shown in the same figure are competitor's and cable operator's market shares<sup>72</sup>.

Figure 65 - FTTH Broadband Market Share



Source: BEREC RA database 2021

<sup>71</sup> Data is confidential in BG, CY, FR, LI and NL and not available in DE (FTTB/C and FTTH not recorded separately), EL, FI, and SI. CZ: share of SMP operator's FTTH lines on all FTTH lines. IE: Eircom FTTH/Total FTTH. PL: biggest operator's share (Orange Polska). PT: FTTH/B only. RO: Incumbent is not SMP. SE: includes all fibre subscriptions, all FTTH.

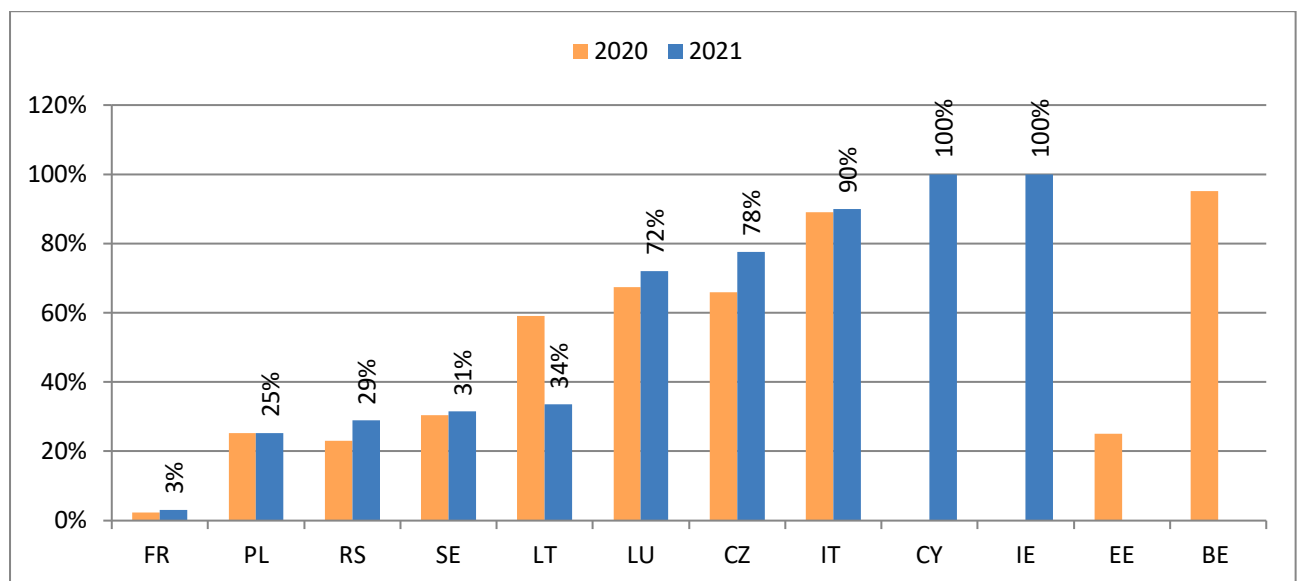
<sup>72</sup> Data is confidential in BG, CY, FR, LI and NL and not available in DE, EL, FI and SI. Cable is included in competitors in BE, HR, RO, RS, SE. CZ: Competitors = share of competitor's FTTH lines on all FTTH lines. HU: cable operators do not have so many FTTH. Part of SMP data (Vodafone/UPC/ Monortel). LU: cable operators do not fall under this FTTH definition. PT: cable operators: FTTH/B only. PT: cable: FTTH/B only.



The next section covers **FTTx and cable coverage on own infrastructure** split into **SMP** own infrastructure (total coverage if more than one operator is present) and **OAO** own infrastructure (total coverage if more than one operator is present and including third party civil infrastructure). As in the previous part, only percentages for 2021 are shown.

**SMP's coverage of Fibre to the Building/Curb (FTTB/C) infrastructure via SLU (as a percentage of total households):**<sup>73</sup> a total of 12 NRAs supplied data in 2021 (not shown are ES and HU with 0 per cent coverage). Coverage is slightly increased in comparison to last year. IE, SE data refers to premises passed (and is therefore not directly comparable).

Figure 66 - SMP FTTB/C Coverage (via SLU): % of households



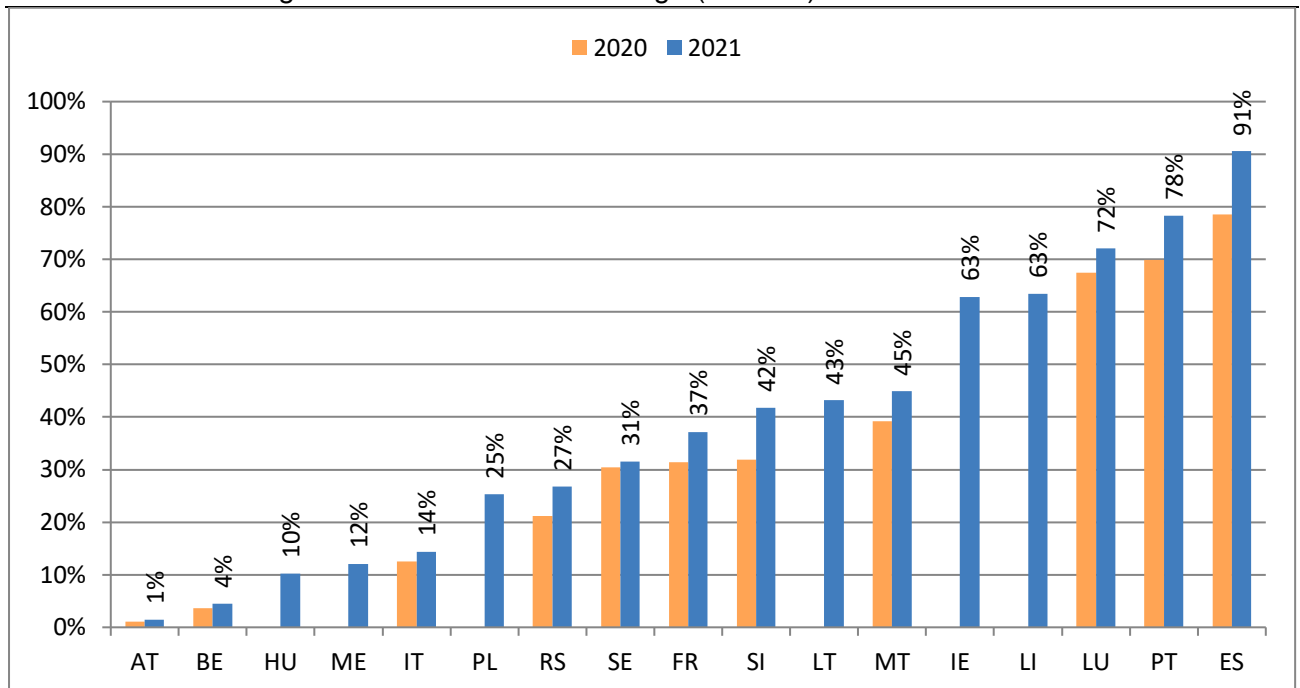
Source: BEREC RA database 2021

**SMP's coverage of Fibre to the Home (FTTH) infrastructure (as a percentage of total households):**<sup>74</sup> a total of 17 NRAs supplied data in 2021. Coverage is slightly increased in comparison to last year. IE, PT, SE data refers to premises connected/passed and is therefore not comparable.

<sup>73</sup> Data is confidential in BG, SK, CZ and not available in AT, DE (FTTB/C and FTTH not recorded separately), DK, EE, EL, FI, HR, LI, LV, ME, MT, NL, NO, PT, RO, SI, XK. IE: EIR own network VDSL premises passed. SE: Includes both FTTH and FTTB, i.e. SDUs and MDUs. There are no FttC in Sweden. Refers to premises connected, which is the only data available.

<sup>74</sup> Data is confidential in BG, CY, CZ, NL, SK and not available in AT, DE (FTTB/C and FTTH not recorded separately), DK, EE, EL, FI, HR, LU, LV, NO, RO, XK. EE data is an estimation based on a 2018 network coverage survey and no validated data is available for 2021. ES: data only available per household, therefore above 100%. IE: EIR own network FTTH premises passed/total FTTH premises passed. PT: % of total premises (cabled premises of Fastfiber) SE: Includes both FTTH and FTTB, i.e. SDUs and MDUs. There are no FttC in Sweden. Refers to premises connected, which is the only data available.

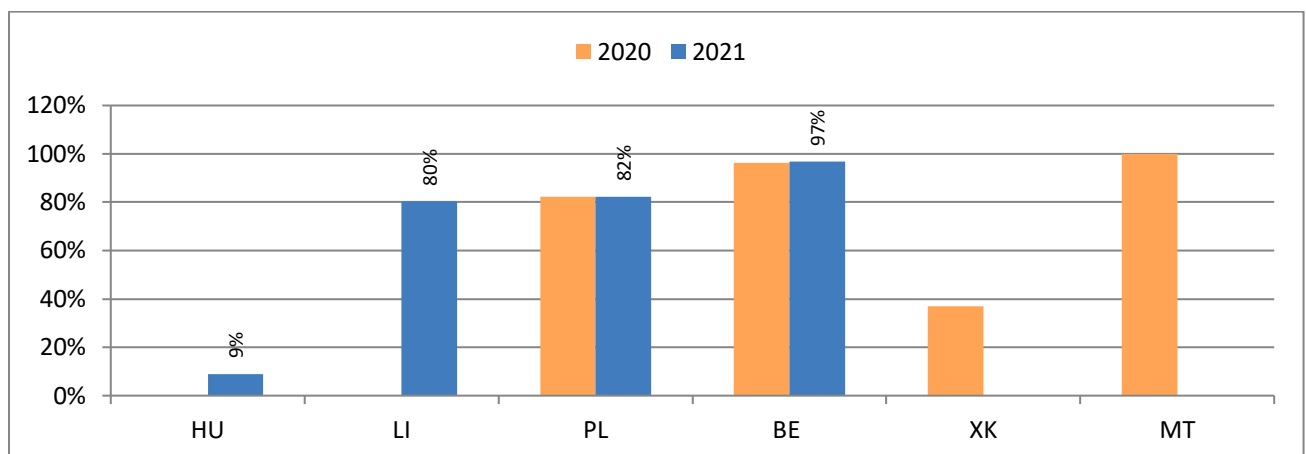
Figure 67 - SMP FTTH Coverage (via SLU): % of households



Source: BEREC RA database 2021

**SMP cable coverage (as a percentage of total households)<sup>75</sup>** was provided in 2021 by 16 NRAs, of which 12 (not shown) reported 0 or close to 0 per cent (AT, CY, CZ, ES, FR, LT, MT, PT, RS, SE, SI, SK).

Figure 68 - SMP Cable Coverage: % of households



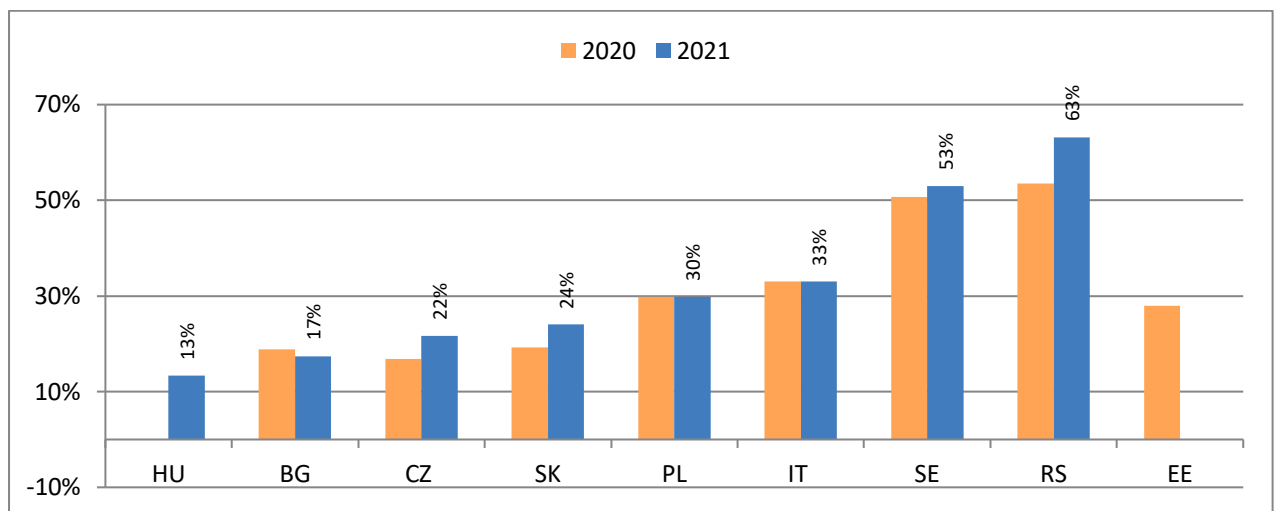
Source: BEREC RA database 2021

The total coverage of the main **OAo Fibre to the Building/Curb (FTTB/C) via SLU (as a percentage of total households)<sup>76</sup>** is provided in 2021 by 11 NRAs (not shown in the graph are CY, FR, ES with 0 per cent). In comparison to 2020, figures are slightly on the increase.

<sup>75</sup> Confidential in NL and not available in BG, DE, DK, EL, FI, HR, IE, IT, LU, LV, NO, RO, XK.

<sup>76</sup> Confidential in LI and not available in AT, BE, DE, DK, EE, EL, FI, HR, IE, LT, LU, LV, NL, NO, RO, XK. EE data is an estimation based on a 2018 network coverage survey and no validated data is available for 2021. PT: data was reported differently in the last year and is therefore not comparable.

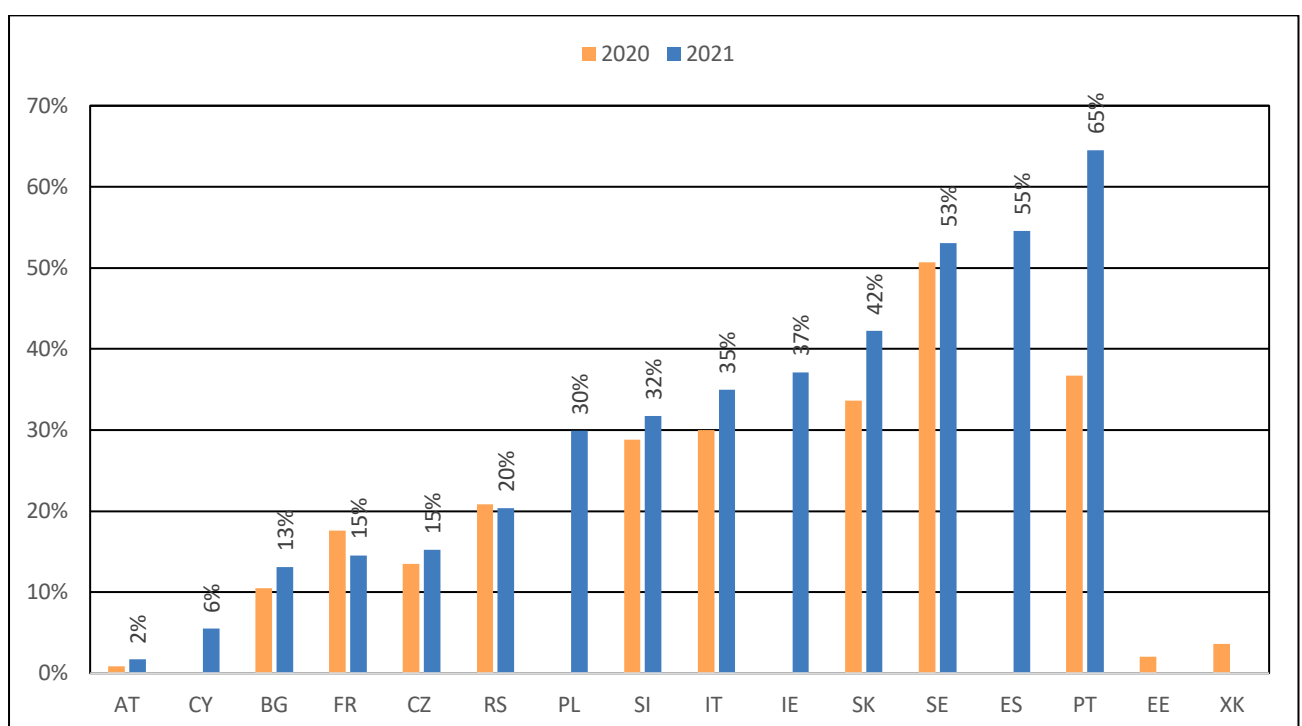
Figure 69 - Main OAO Coverage on Own Network FTTB/C: % of households



Source: BEREC RA database 2021

**Fibre to the Home (FTTH) coverage of the main OAO via their own infrastructure (as a percentage of total households)<sup>77</sup>** resulted in 16 NRAs reporting data in 2021 (HU, MT are not shown in the graph since coverage is 0 or close to 0 per cent), the highest coverage being recorded in Portugal and Spain (where data was recorded differently than in the previous year and is therefore not comparable).

Figure 70 - Main OAO Coverage on Own Network FTTH: % of households

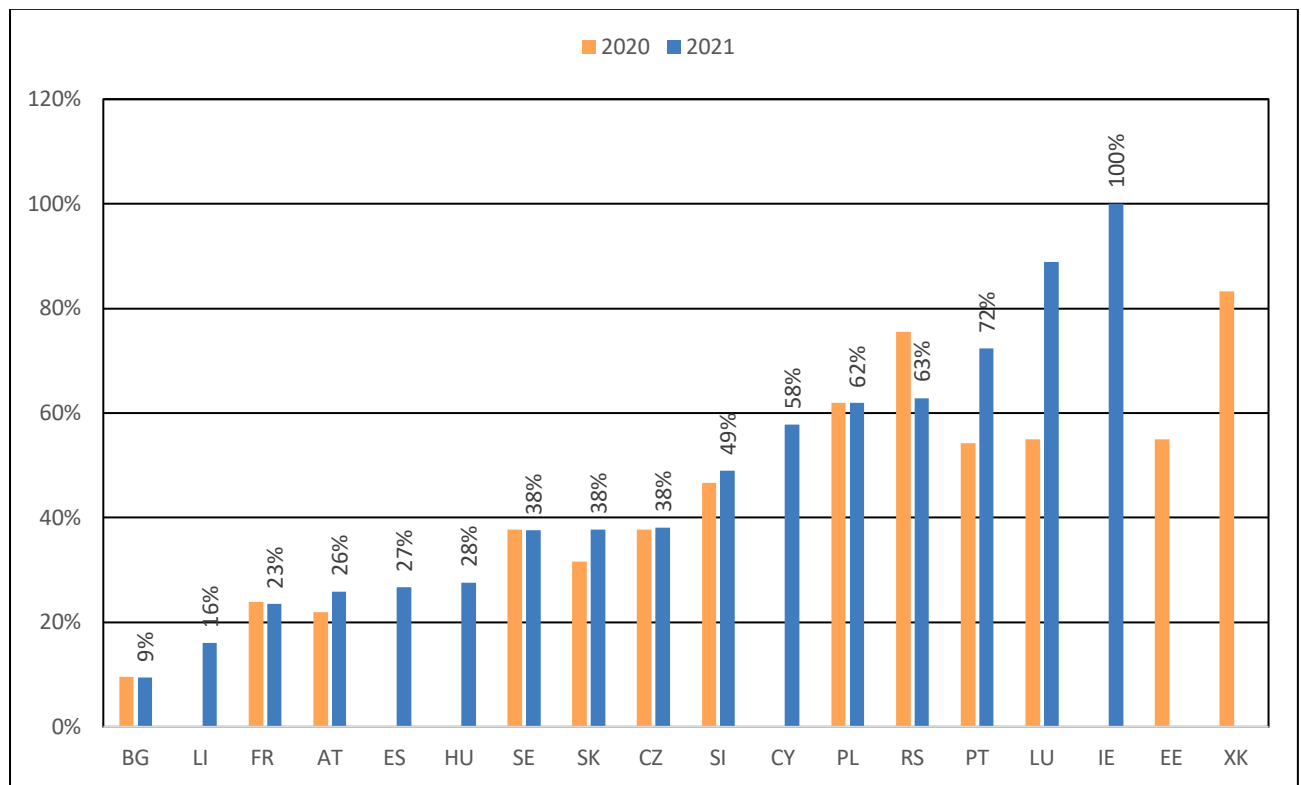


Source: BEREC RA database 2021

<sup>77</sup> Not available in BE, DE, DK, EE, EL, FI, HR, LT, LU, LV, NL, NO, RO, XK. 0% or close to 0% in LI, MT, SE, HU. EE data is an estimation based on a 2018 network coverage survey and no validated data is available for 2021.

The total **cable coverage of OAO on own cable network (as a percentage of total households)**<sup>78</sup> resulted in a response of a total of 16 NRAs in 2021. In ES, PT, data was recorded differently than in the previous year and is therefore not comparable.

Figure 71 - Main OAO Cable Coverage on Own Cable Network: % of households



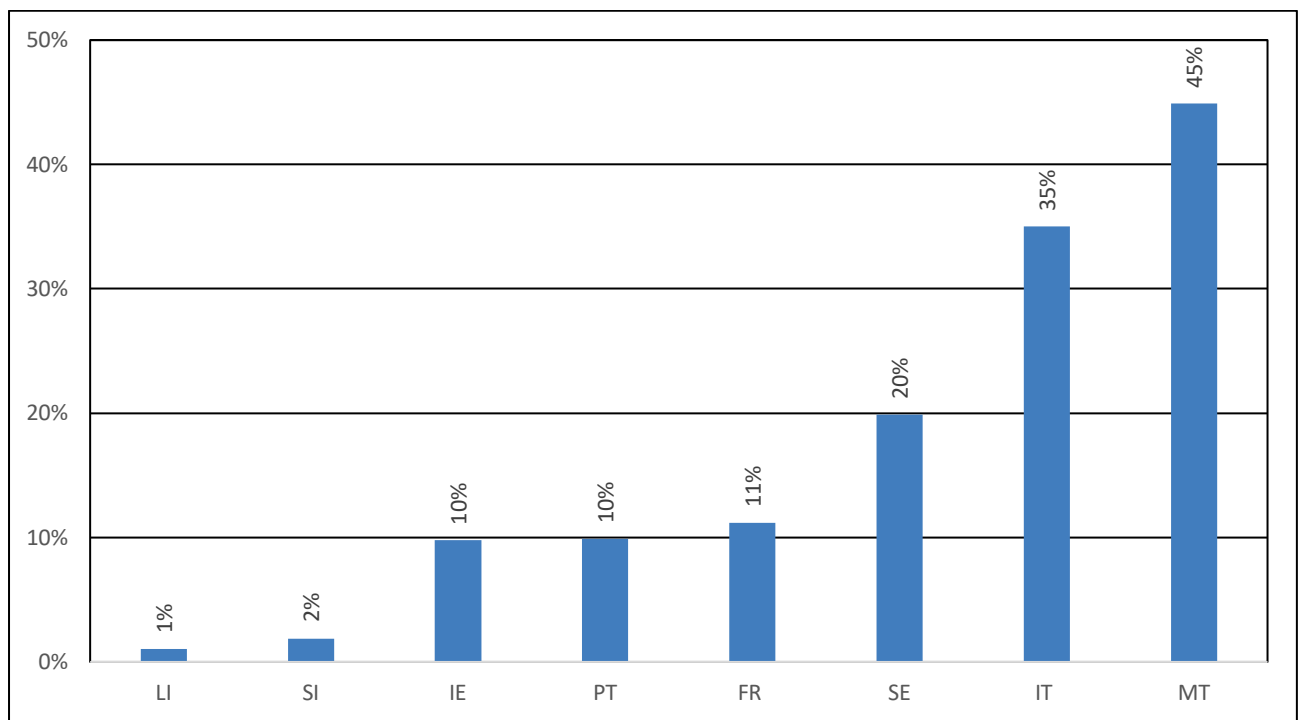
Source: BEREC RA database 2021

The newly added question in 2021: total **wholesale only OAO FTTH coverage (as a percentage of total households)**<sup>79</sup> resulted in a response of 12 NRAs, of which AT, CY, HU, RS are not shown in the graph because their coverage is 0 or close to 0 per cent.

<sup>78</sup> Confidential in NL and not available in BE, DE, DK, EE, EL, FI, HR, IT (no cable coverage), LT, LV, ME, MT, NO, RO, XK. EE data is an estimation based on a 2018 network coverage survey and no validated data is available for 2021. PT: data was recorded differently in previous year, therefore it is not comparable.

<sup>79</sup> Not available in BE, BG, CZ, DE, DK, EE, EL, FI, HR, LT, LU, LV, ME, NL, NO, PL, RO, SK, XK.

Figure 72 - Wholesale Only Main OAO FTTH Coverage: % of households



Source: BEREC RA database 2021

## Appendix I

### List of Participating Countries/NRAs

The following countries / NRA's have provided data for the 2021 RA Report:

AT	Austria (RTR)
BE	Belgium (BIPT)
BG	Bulgaria (CRC)
CY	Cyprus (OECPR)
CZ	Czechia (CTU)
DE	Germany (BNETZA)
DK	Denmark (DBA)
EE	Estonia (ETRA)
EL	Greece (EETT)
ES	Spain (CNMC)
FI	Finland (TRAFICOM)
FR	France (ARCEP)
HR	Croatia (HAKOM)
HU	Hungary (NMHH)
IE	Ireland (COMREG)
IT	Italy (AGCOM)
LI	Liechtenstein (AK LLV)
LV	Latvia (SPRK)
LT	Lithuania (RRT)
LU	Luxemburg (ILR)
ME	Montenegro (EKIP)
MT	Malta (MCA)
NL	Netherlands (ACM)
NO	Norway (NKOM)
PL	Poland (UKE)
PT	Portugal (ANACOM)
RO	Romania (ANCOM)
RS	Republic of Serbia (RATEL)
SE	Sweden (PTS)
SI	Slovenia (AKOS)
SK	Slovakia (RU)
XK	Kosovo <sup>*80</sup> (ARKEP)

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<sup>80</sup> \*This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence.

## Accompanying Tables (based on the 2021 survey)

Figure 73 - Ref Figure 3 – SMP regulation

M2_2007	M3a_ULL	M3a_SLU	M3a_SA	M3a_(SMP_Ts)	M3a_fiberLLU	M3a_VULA (FTTC)	M3a_VULA (FTTH)	M3a_VULA (cable <3.0)	M3a_VULA (cable >3.0)	M3a_DF	M3a_DA	M3b_2014_legacy	M3b_NGAM (FTTC)	M3b_NGAM (FWA)	M3b_2014_(FTTH)	M3b_(cable <3.0)	M3b_(cable >3.0)	M4_Active_Legacy	M4_Active_(NGA)	M4_2014_Passive
DE ES HR IE IT ME	AT BE CY CZ DE DK EE EL ES FI FR HR HU IE IT LI LT LU LV ME MT NO PL PT RS SE SI SK	AT CY CZ DE EE EL ES FI FR HR HU IE IE IT LI LT LU LV ME MT NO PL PT RS SE	BE CY CZ DKEE FI FR HU IE LU LV ME MT NO PL RS SE SI SK	HU IE IT PL	BE CZ DE DKEE FI HR HU IE LT LU LV NO PL SE SI SK	AT BE CY CZ DE EL FI HR HU IE IT LV LV MT NO SI SK	AT BE CY CZ EL ES FI HR HU IE IT LU LV MT NO SI SK	IE	IE	CZ DE DK EL FR HR HU IE IE IT LI LT LV NO PL PT RS SI SK	BE DE EE EL ES FR HR HU IE IT LI LT LV NO PL PT RS SI SK	AT BE CY CZ DE DK EE EL ES FI FR HR HU IE IT LT LU LV NO PL PT RS SI SK	AT BE CY CZ DE EE EL FI HR HU IE IT LV NO PL SI SK	DE EE LV NO PL SK	AT BE CZ DKEE ES FI HR HU IE IT LT LU LV PL SI SK	BE HU RS	BE HU	BE CY CZ DE EL ES FI FR HR IE LT LU ME MT NL PT SI	AT BE CY CZ DE EL ES FI FR HR HU IE IT LT LU ME MT PT SI	AT BE CY LT

Figure 74 - Ref Figure 7-8 – Geographical regulation

	M2_2007	M3a_ULL	M3a_SLU	M3a_SA	M3a_(SY_TS)	M3a_(SY_PB_TS)	M3a_(SMP_TS)	M3a_fiberLLU	M3a_VULA (FTTC)	M3a_VULA (FTTH)	M3a_VULA (cable <3.0)	M3a_VULA (cable >3.0)	M3a_DF	M3a_DA	M3b_2014_LeNGA (FTTC)	M3b_2014_LeNGA (FWA)	M3b_2014_(FTTH)	M3b_(cable <3.0)	M3b_(cable >3.0)	M4_Active_LeNGA	M4_Active_(NGA)	M4_2014_Passive	
2021		BE FI HU IT PL	FI HU IT PL	BE FI HU PL	FR	FR	HU IT PL	BE DK FI HU PL	BE FI HU IT	BE ES FI HU IT			DK HU IT PL	BE HU IT PL	BE ES FI HU IE IT PL PT SI	BE FI HU IE IT PL	IE PL	BE DK ES FI HU IE IT PL SI	BE HU	BE HU	BE FI FR PT	AT BE FI FR IE IT PT	AT
2020	PL	BE FI HU PL	FI HU PL	BE FI HU PL				DK FI HU PL	BE FI HU IT	BE ES FI HU IT			HU PL	HU PL	BE DE ES FI FR HU IE IT PL PT SI	BE DE FI HU IE IT PL		BE ES FI HU IT PL			BE FI FR PT	AT BE FI FR IE PT	AT FI IE PL
2019	PL	BE FI HU PL	FI HU PL	BE FI HU PL				BE DK FI HU PL	BE FI HU IT	BE ES FI HU IT			HU PL	HU	BE ES FI FR HU IE IT PL PT SI						BE FI FR PL PT	AT BE FI FR PL PT	AT PL



	M2_2007	M3a_ULL	M3a_SLU	M3a_SA	M3a_(SY_TS)	M3a_(SY_PB_TS)	M3a_(SMP_TS)	M3a_fiberLLU	M3a_VULA (FTTC)	M3a_VULA (FTTH)	M3a_VULA (cable <3.0)	M3a_VULA (cable >3.0)	M3a_DF	M3a_DA	M3b_2014_legacy	M3b_NGA (FTTC)	M3b_NGA (FWA)	M3b_2014_(FTTH)	M3b_(cable <3.0)	M3b_(cable >3.0)	M4_Active_Legacy	M4_Active_(NGA)	M4_2014_Passive
Market		FI HU IT PL	FI HU IT PL	FI HU PL			HU IT PL	FI HU PL	FI HU PL	FI HU PL	PL	PL	HU IT PL	HU IT PL	FI HU IE PL	FI HU IE PL	IE PL	FI HU IE PL	HU	HU	FI	AT FI	AT
Market_and_Remedies								IT	IT						ES FR IT	IT		ES IT			PT	IT PT	
Remedies		BE		BE	FR	FR		BE DK	BE	BE ES			DK	BE	BE SI	BE SI		BE DK SI	BE	BE	BE FR	BE FR IE	

Figure 75 - Ref Figure 11 – SMP remedies

	M2_2007	M3a_ULL	M3a_SLU	M3a_SA	M3a_(SMP_TS)	M3a_fiberLLU	M3a_VULA (FTTC)	M3a_VULA (FTTH)	M3a_VULA (cable <3.0)	M3a_VULA (cable >3.0)	M3a_DF	M3a_DA	M3b_2014_Le gacy	M3b_NGA (FTTC)	M3b_NGA (FWA)	M3b_2014_(F TTH)	M3b_(c cable>3.0)	M3b_(cable>3.0)	M4_Ac tive_Le gacy	M4_Ac tive_(N GA)	M4_2014_Pas sive	
Art. 69 of Directive 1972/2018 or Art. 9 Access Directive	DE ES HR IE IT ME	BE CY CZ DE DK EE EL ES FI FR HR HU IE IT LU LT LU LV ME MT NO PL PT RS SE SI SK	CY CZ DE EE EL ES FI FR HR HU IE IT LU LT LU LV ME MT NO PL SE	BE CY CZ DE DK EE FI FR HU IE LT LU LV ME MT NO PL RS SE SI SK	EE HU IE IT PL	BE CZ DE DK EL FI HR HU IE LT LU LV NO PL SE SI SK	BE CY CZ DE EL FI HR HU IE LV SI SK	BE CY CZ DE EL ES FI FR HR HU IE IT LU LV MT NO SI SK	PL IE	PL IE	CZ DE DK EL FR HR HU IE IT LT LU LV PL RS SI	BE DE EE EL ES FI FR HR HU IE IT LV NO PL PT RS SI SK	BE CY CZ DE DE DK EE EL ES FI FR HR HU IE IT LU LV NO PL PT RS SI SK	BE CY CZ DE EE EL FI HR HU IE IT LU LV PL SI SK	IE IT NO	DE LU LV SK	BE CZ DK EE ES FI FR HR HU IE IT LU LV PL SI SK	BE HU RS	BE HU	BE CY CZ DE EL ES FI FR HR HU IE IT LU ME MT NL PT SI	BE CY CZ DE EL ES FI FR HR HU IE IT LT LU ME MT PT SI	BE CY
Obligation to publish a reference offer	DE ES HR IE IT ME	AT BE CY CZ DE DK EE EL ES FI FR HR HU IE IT LU LT LU LV ME MT NO PL PT RS SI SK	AT CY CZ DE EE EL ES FI FR HR HU IE IT LU LV ME MT NO PL	BE CY CZ DE DK EE FI FR HU IE LT LU LV ME MT NO PL RS SE SI SK	EE HU IE IT PL	BE CZ DE DK EL FI HR HU IE LT LU LV NO PL SE SI SK	AT BE CY CZ DE EL HR HU IE IT LV SI SK	AT BE CY CZ DE EL ES FI FR HR HU IE IT LU LV MT NO SI SK	PL IE	PL IE	CZ DE DK EL FR HR HU IE IT LT LU LV PL RS SI	BE DE EE EL ES FI FR HR HU IE IT LV PL PT RS SI SK	AT BE CY CZ DE DE DK EE EL ES FI FR HR HU IE IT LU LV NO PL PT RS SI SK	AT BE CY CZ DE EE EL FI HR HU IE IT LU LV PL SI SK	IE IT NO	DE LU LV SK	AT BE CZ DE DK EE ES FI FR HR HU IE IT LU LV PL SI SK	BE HU RS	BE HU	BE CY CZ DE EL ES FI FR HR HU IE IT LU ME MT NL PT SI	AT BE CY CZ DE EL ES FI FR HR HU IE IT LT LU ME MT PT SI	AT BE CY
Art. 70 of Directive 1972/2018 or Art. 10 Access Directive	DE ES HR IE IT ME	AT BE CY CZ DE DK EE EL ES FI FR HR HU IE IT LU LT LU LV ME MT NO PL PT RS SE SI SK	AT CY CZ DE EE EL ES FI FR HR HU IE IT LU LV ME MT NO PL SE	BE CY CZ DE DK EE FI FR HU IE LT LU LV ME MT NO PL RS SE SI SK	EE HU IE IT PL	BE CZ DE DK EL FI HR HU IE LT LU LV NO PL SE SI SK	AT BE CY CZ DE EL FI HR HU IE IT LV SI SK	AT BE CY CZ DE EL ES FI FR HR HU IE IT LU LV MT NO SI SK	PL IE	PL IE	CZ DE DK EL FR HR HU IE IT LT LU LV PL RS SI	BE DE EE EL ES FI FR HR HU IE IT LV NO PL PT RS SI SK	AT BE CY CZ DE DE DK EE EL ES FI FR HR HU IE IT LU LV NO PL PT RS SI SK	AT BE CY CZ DE EE EL FI HR HU IE IT LU LV PL SI SK	IE IT NO	DE LU LV SK	AT BE CZ DE DK EE ES FI FR HR HU IE IT LU LV PL SI SK	BE HU RS	BE HU	BE CY CZ DE EL ES FI FR HR HU IE IT LU ME MT NL PT SI	AT BE CY CZ DE EL ES FI FR HR HU IE IT LU ME MT PT SI	AT BE CY
Art. 71 of Directive 1972/2018 or Art. 11 Access Directive	DE ES HR IE IT ME	AT BE CY CZ DE DK EE EL ES FI FR HR HU IE IT LU LT LU LV ME MT NO PL PT RS SE SI SK	AT CY CZ DE EE EL ES FI FR HR HU IE IT LU LV ME MT PL	CY CZ DE EE EL ES FI FR HU IE LT LU LV ME MT NO PL RS SE SI SK	EE HU IE IT PL	CZ HR HU IE LT LV MT NO PL SE SI SK	AT CY CZ DE EL HR HU IE IT LV SI SK	AT CY CZ DE EL ES FI FR HR HU IE IT LU LV MT NO SI SK	PL IE	PL IE	CZ EL FR HU IE IT LT LU LV PL RS SI	EE EL ES FI FR HR HU IE IT LV NO PL PT RS SI SK	AT CY CZ DE EE EL ES FI FR HR HU IE IT LV PL PT RS SI SK	AT CY CZ DE EE EL HR HU IE IT LU LV PL SI SK	IE IT NO	DE LU LV SK	AT CZ DE EE EL ES FI FR HR HU IE IT LU LV PL SI SK	BE HU RS	HU	CY CZ DE EL ES FI FR HR HU IE IT ME MT NL PT SI	AT CY CZ DE EL ES FI FR HR HU IE IT ME MT PT SI	AT CY
Have you imposed access to, and use of, specific network elements and associated facilities (Art. 73 of Directive 1972/2018 or Art. 12 Access Directive)?	DE ES HR IE IT ME	AT BE CY CZ DE DK EE EL ES FI FR HR HU IE IT LU LT LU LV ME MT NO PL PT RS SE SI SK	AT CY CZ DE EE EL ES FI FR HR HU IE IT LT LU LV ME MT NO PL SE	BE CY CZ DE DK EE FI FR HU IE LT LU LV ME MT NO PL RS SE SI SK	EE HU IE IT PL	BE CZ DE DK EL FI HR HU IE LT LU LV NO PL SE SI SK	AT BE CY CZ DE EL FI HR HU IE IT LV SI SK	AT BE CY CZ DE EL ES FI FR HR HU IE IT LU LV MT NO SI SK	IE	IE	CZ DE DK EL FR HR HU IE IT LT LU LV PL RS SI	BE DE EE EL ES FI FR HR HU IE IT LV NO PL PT RS SI SK	AT BE CY CZ DE DE DK EE EL ES FI FR HR HU IE IT LU LV NO PL PT RS SI SK	AT BE CY CZ DE EE EL FI HR HU IE IT LU LV PL SI SK	IE IT NO	DE LU LV SK	AT BE CZ DE DK EE ES FI FR HR HU IE IT LU LV PL SI SK	BE HU RS	BE HU	BE CY CZ DE EL ES FI FR HR HU IE IT ME MT NL PT SI	AT BE CY CZ DE EL ES FI FR HR HU IE IT LU ME MT PT SI	AT BE CY
Have you imposed price control (Art. 74 of Directive 1972/2018 or Art. 13 Access Directive)?	DE ES HR IE IT ME	AT BE CY CZ DE DK EE EL ES FI FR HR HU IE IT LU LT LU LV ME MT NO PL PT RS SE SI SK	AT CY CZ DE EE EL ES FI FR HR HU IE IT LT LU LV ME MT NO PL SE	BE CY CZ DE DK EE FI FR HU IE LT LU LV ME MT NO PL RS SE SI SK	EE HU IE IT PL	BE CZ DE DK EL FI HR HU IE LT LU LV NO PL SE SI SK	AT BE CY CZ DE EL FI HR HU IE IT LV SI SK	AT BE CY CZ DE EL ES FI FR HR HU IE IT LU LV MT NO SI SK	IE	IE	CZ DE DK EL FR HR HU IE IT LT LU LV PL RS SI	BE DE EE EL ES FI FR HR HU IE IT LV NO PL PT RS SI SK	AT BE CY CZ DE DE DK EE EL ES FI FR HR HU IE IT LU LV NO PL PT RS SI SK	AT BE CY CZ DE EE EL FI HR HU IE IT LU LV PL SI SK	IE IT NO	DE LU LV SK	AT BE CZ DE DK EE ES FI FR HR HU IE IT LU LV PL SI SK	BE HU RS	BE HU	BE CY CZ DE EL ES FI FR HR HU IE IT ME MT NL PT SI	AT BE CY CZ DE EL ES FI FR HR HU IE IT LU ME MT PT SI	AT BE CY
Have you imposed cost accounting (Art. 74 of Directive 1972/2018 or Art. 13 Access Directive)?	DE ES HR IE IT ME	AT BE CY CZ DE DK EE EL ES FI FR HR HU IE IT LU LT LU LV ME MT NO PL PT RS SE SI SK	AT CY CZ DE EE EL ES FI FR HR HU IE IT LT LU LV ME MT NO PL SE	BE CY CZ DE DK EE FI FR HU IE LT LU LV ME MT NO PL RS SE SI SK	EE HU IE IT PL	BE CZ DE DK EL FI HR HU IE LT LU LV NO PL SE SI SK	AT BE CY CZ DE EL FI HR HU IE IT LV SI SK	AT BE CY CZ DE EL ES FI FR HR HU IE IT LU LV MT NO SI SK	IE	IE	CZ DE DK EL FR HR HU IE IT LT LU LV PL RS SI	BE DE EE EL ES FI FR HR HU IE IT LV NO PL PT RS SI SK	AT BE CY CZ DE DE DK EE EL ES FI FR HR HU IE IT LU LV NO PL PT RS SI SK	AT BE CY CZ DE EE EL FI HR HU IE IT LU LV PL SI SK	IE IT NO	DE LU LV SK	AT BE CZ DE DK EE ES FI FR HR HU IE IT LU LV PL SI SK	BE HU RS	BE HU	BE CY CZ DE EL ES FI FR HR HU IE IT ME MT NL PT SI	AT BE CY CZ DE EL ES FI FR HR HU IE IT LU ME MT PT SI	AT BE CY

Figure 76 - Ref Figure 17 – Price control main category

	M2_2007	M3a_ULL	M3a_SLU	M3a_SA	M3a_(SMP_Ts)	M3a_fiberLLU	M3a_VULA (FTTC)	M3a_VULA (FTTH)	M3a_VULA (cable <3.0)	M3a_VULA (cable >3.0)	M3a_DF	M3a_DA	M3b_2014_legacy	M3b_NGA (FTTC)	M3b_NGA (FWA)	M3b_2014_(FTTH)	M3b_(cable <3.0)	M3b_(cable >3.0)	M4_Active_Legacy	M4_Active_(NGA)	M4_2014_Passive	
Cost_Orientation	ES HR IE IT ME	BE CY DE DK EL ES FI FR HR HU IE IT LI LU LV ME MT NO PL PT RS SE SI	CY DE EL ES FI FR HR HU IE IT LT LU LV ME NO PL SE	BE CY DK FI FR HU HU LT LV ME MT NO PL RS SE SI	HU IT PL	DK FI HR HU LT LV PL	BE CY DE EL HR HU IE IT LV	CY EL HR HU IT LV			CZ DE DK EL HR HU IE IT LT LV PL RS SI	DE EL ES FR HR HU IE IT LT LV NO PL PT RS SI SK	BE CY DE DK EL FR HR HU IE IT LT LV NO PL RS SI	BE CY DE EL HR HU IE IT LV PL		DE HR HU IT LT LV PL	HU RS	HU	CY DE ES FR HR IE LT LU MT NL PT	AT CY DE HR HU IE IT LT LU PT	AT CY PL	
Retail_minus						SI	AT SI	AT ES MT SI					AT ES	AT SI		AT ES SI			EL	EL		
Benchmarking																						
Others/Combination		AT CZ	AT CZ	CZ		BE CZ LU	CZ FI	BE CZ FI IE LU NO			FR	BE	LU	LU	NO	IE BE LU	BE	BE	BE	BE SI	BE FR SI	BE

Figure 77 - Ref Figure 10 – Price control cost orientation-Sub category

	M2_2007	M3a_2014_M014_MULL	M3a_2014_M014_MSLU	M3a_2014_M014_MSA	M3a_2014_TS(in-house wiring)_SMP	M3a_2014_M014_MfiberLU	M3a_2014_M014_MVULAF(TTFC)	M3a_2014_M014_MVULAF(TTTH)	M3a_2014_M014_MVULAF(cable Docsis <3.0)	M3a_2014_M014_MVULAF(cable Docsis >3.0)	M3a_2014_M014_MDF	M3a_2014_M014_MDA	M3b_2014_Legacy	M3b_2014_NGA(including FTTC)	M3b_2014_NGA(including FWA)	M3b_2014_FTTT	M3b_2014_Cable docsis <3.0)	M3b_2014_Cable docsis >3.0)	M4_2014_Active_Legacy	M4_2014_Active_NGA(native Ethernet)	M4_2014_Passive
Cost_Orientation	ES HR IE IT ME	BE CY DE DK EL ES FI FR HR HU IE IT LI LT LU LV ME MT NO PL PT RS SE SI	CY DE EL ES FI FR HU IE IT LT LU LV ME MT NO PL RS SE SI	BE CY DE DK EL ES FI FR HU LT LV ME MT NO PL RS SE SI	HU IT PL	DK FI HR HU LT LV PL	BE CY DE EL HR HU IE IT LV	CY EL HR HU IT LV	CZ DE DK EL HR HU IE IT LT LV PL RS SI	DE EL ES FR HR HU IE IT LT LV NO PL PT RS SI SK	BE CY DE DK EL FR HR HU IE IT LT LV NO PL RS SI	BE CY DE EL HR HU IE IT LV PL	IE DE LV	DK HR HU IT LT LV PL	HU RS	HU	CY DE ES FR HR HU IE LT LU MT NL PT	AT CY DE HR HU IE IT LT LU PT	AT CY PL		
Cost orientation alone	ES HR IT	BE CY DE EL ES FI FR HU IE IT LI LT LU LV ME MT NO PL PT RS SI	CY DE EL ES FI FR HU IT LT LV MT PL	BE CY DE EL ES FI FR HU LT LV ME MT NO PL RS SI	HU IT PL	HU LV PL	BE CY DE EL HU IT LV	CY EL HU IT LV	CZ DE EL HR HU IT LT LV PL RS SI	DE EL ES FR HR HU IT LT LV NO PL PT RS SI	BE CY DE EL HR HU IT LT LV NO PL RS SI	BE CY DE EL HU IT LV PL	DE LV	HU IT LT LV PL	HU RS	HU	CY DE ES HR HU LT MT	CY DE HR HU IT LT	CY PL		
Price cap alone		DK FR HR LU NO SE	FR LU NO SE	DK FR NO SE		DK HR	HR	HR	DK	SK	DK FR NO	HR		DK HR			LU NL	AT LU	AT		

Figure 78 - Ref Figure 26 a-b – Margin squeeze test

	M2_2007	M3a_ULL	M3a_SLU	M3a_SA	M3a_(SM P_TS)	M3a_fiber LLU	M3a_VUL A (FTTC)	M3a_VUL A (FTTH)	M3a_VUL A (cable <3.0)	M3a_VUL A (cable >3.0)	M3a_DF	M3a_DA	M3b_2014_legacy	M3b_NGA (FTTC)	M3b_NGA (FWA)	M3b_2014_(FTTH)	M3b_(cable <3.0)	M3b_(cable >3.0)	M4_Active_Legacy	M4_Active_(NGA)	M4_2014_Passive
ex- ante MS test	DE	CZ DE EL HR IT	CZ DE HR IT	CZ		HR EL	CZ DE HR IE IT	CZ EL HR IE IT			DE	DE	AT DE EL HR IE IT PL	AT DE EL HR IE PL	DE IE	AT HR IE IT PL			DE SI	DE FR SI	
ERT (Economic Replicability Test)		AT CY SK	AT CY	CY SK		CZ LU SE SI SK	AT CY SI SK	AT CY ES MT NO SI SK					CY ES SK	CY LU SI SK	SK	ES LU SI SK			PT	PT	
ex-post MS test		BE DK EE LT	EE LT	BE DK EE LT		BE DK EE LT	BE LT	BE LT	LT	LT	DK LT	BE EE LT	BE DK EE	BE EE	EE	BE DK EE	BE	BE	BE LT NL	BE ES LT	LT

Figure 79 - Ref Figure 29 – Equivalence model

	M2_2007	M3a_ULL	M3a_SLU	M3a_SA	M3a_(SY TS)	M3a_(SY PB_TS)	M3a_(SM P_TS)	M3a_fiber LLU	M3a_VUL A (FTTC)	M3a_VUL A (FTTH)	M3a_VUL A (cable <3.0)	M3a_VUL A (cable >3.0)	M3a_DF	M3a_DA	M3b_2014_legacy	M3b_NGA (FTTC)	M3b_NGA (FWA)	M3b_2014_(FTTH)	M3b_(cable <3.0)	M3b_(cable >3.0)	M4_Active_Legacy	M4_Active_(NGA)	M4_2014_Passive	
EOI	ES	CZ ES IT LU SI SK	CZ ES IT LU	CZ LU SK				CZ LU SE SI SK	CY CZ SK	CY ES IT LU SI SK			CZ	FR SI	ES	CZ LU SI SK	CZ LU SI SK	SK	CZ ES LU SI SK			CZ ES SI	CZ ES SI	
EOO	IT	AT BE CY DK EE EL FR HR HU NO SE	AT CY EE EL FR HR HU NO SE	BE CY DK EE FR HU NO SE			HU	BE DK EE HR HU NO	AT BE HR HU EL	AT BE HR HU MT NO	HR	HR FR HR HU IT	DK HR HU IT	BE EE HR HU IT NO	AT BE CY DK EE EL FR HR HU NO	AT BE CY EE EL HR HU IT	EE NO	AT BE DK EE HR HU IT	BE HU	BE HU	BE FR HR	EL EL	AT BE HR HU IT	AT BE
Other	ME	LV ME	LV ME	LV ME				LV	LV	LV			LV	LV SK	LV	LV	LV	LV				LU	FR LU	

Figure 80 - Ref Figure 32 - Cost base

	M2_2_007	M3a_ULL	M3a_SLU	M3a_SA	M3a_(SMP_TS)	M3a_fiberLU	M3a_VULA (FTTC)	M3a_VULA (FTTH)	M3a_VULA (cable <3.0)	M3a_VULA (cable >3.0)	M3a_DF	M3a_DA	M3b_2014_legacy	M3b_NGA (FTTC)	M3b_NGA (FWA)	M3b_2014 (FTTH)	M3b_ (cable <3.0)	M3b_ (cable >3.0)	M4_Active_Legacy	M4_Active_ (NGA)	M4_2014_Passive
HCA	IE	LI MT	LT NO	LT NO	LT NO						LT	ES LT NO	LT NO			LT			LT	AT HU	LT
CCA	DE ES HR IT ME	AT BE CY DE DK EL ES FI FR HR HU IE IT LU LV ME PL RS SE SI	AT CY DE EL ES FI FR HR HU IE IT LU LV ME PL RS SE SI	BE CY DK FI FR HU LV ME PL RS SE SI	HU IT PL	BE FI HR HU LV PL	BE CY DE EL HR HU IE IT LV	BE CY DE EL ES HR HU IT LV			CZ DE DK EL FR HR HU IE IT LV PL RS SI	BE DE EL FR HR HU IE IT LV PL RS SI	BE CY DE DK EL ES FR HR HU IE IT LV PL RS SI	BE CY DE EL FR HR HU IE IT LV PL	DE DK ES FR HR HU IE IT LV PL	BE DE ES FR HR HU IE IT LV PL	BE HU RS	BE HU	BE CY DE ES FR HR HU IE IT LU MT NL	BE CY DE ES FR HR HU IE IT LU	AT BE CY HR PL

Figure 81 - Ref Figure 33 - Annualisation method

	M2_2007	M3a_ULL	M3a_SLU	M3a_SA	M3a_(SMP_TS)	M3a_fiberLU	M3a_VULA (FTTC)	M3a_VULA (FTTH)	M3a_VULA (cable <3.0)	M3a_VULA (cable >3.0)	M3a_DF	M3a_DA	M3b_2014_legacy	M3b_NGA (FTTC)	M3b_NGA (FWA)	M3b_2014 (FTTH)	M3b (cable <3.0)	M3b (cable >3.0)	M4_Active_Legacy	M4_Active (NGA)	M4_2014_Passive
Straight-line (linear depreciation)	ES	FI CY LV LI RS	FI CY LV	FI CY LV RS		FI LV	CY LV	CY LV NO			LV RS	ES LV RS	CY LV RS	CY LV	LV	LV	RS		CY ES NL	AT CY HU	AT CY
Annuity	DE	DE IT	DE IT		IT		DE IT	IT			DE IT	DE IT	DE IT	DE IT	DE IT	IT			DE	DE IT	
Tilted annuity	HR IT	BE DK EL FR HR HU IE LU PL SE SI	FR IE HU LU PL SE	BE DK FR HU PL SE SI	HR HU PL	HR HU PL	DK HR HU PL	EL HR HU	EL HR HU			CZ DK EL HR HU IE PL	EL FR HU IE PL SI SK	BE DK EL FR HR HU IE NO PL	BE EL HR HU PL	DK HR HU PL	HU	HU	BE FR HR IE LU	HR IE LU	PL
Economic depreciation	ME	AT ES ME NO	AT ES ME NO	ME NO			IE	BE ES					ES	IE	IE	BE ES	BE	BE			

Figure 82 - Ref Figure 34 - Allocation method main category

	M2_2007	M3a_ULL	M3a_SLU	M3a_SA	M3a_(SMP_TS)	M3a_fiberLLU	M3a_VULA (FTTC)	M3a_VULA (FTTH)	M3a_VULA (cable <3.0)	M3a_VULA (cable >3.0)	M3a_DF	M3a_DA	M3b_2014_legacy	M3b_NGA (FTTC)	M3b_NGA (FWA)	M3b_2014_(FTTH)	M3b_(cable <3.0)	M3b_(cable >3.0)	M4_A_active_Legacy	M4_A_active_NGA	M4_2014_Passive
FDC	ES	FI LI LT LV MT RS	FI LT LV MT	FI FR LT LV MT RS		FI LT LV	LV	LV			LT LV RS	ES FR HR LV NO RS	LT LV RS	LV	LV	LT LV	RS		ES FR IE LT MT NL	AT IE LT	AT
LR_A_IC	HR IE IT	AT BE DE DK EL FR HR HU IE IT NO PL	AT DE EL FR HU IE IT NO PL	BE DK HU NO PL	HU IT PL	BE DK HR HU PL	BE DE EL FR HU IE IT	BE EL HR HU IT			DE DK EL FR HR HU IT PL	BE DE EL FR HU IT PL SK	BE DE DK EL FR HR HU IE IT NO PL	BE DE EL FR HU IE IT PL	DE IE IT	BE DK HR HU IT PL	BE HU	BE HU	BE DE HR	BE DE HR IT	BE PL
LRIC	DE	CY ES LU SE SI	CY ES LU SE	CY SE SI			CY	CY ES			CZ SI	SI	CY ES SI	CY		ES			CY LU	CY LU	CY



Figure 83 - Ref Figure 35 – Allocation method sub-category

	M2_2007	M3a_ULL	M3a_SLU	M3a_SA	M3a_(SMP_TS)	M3a_fiberLU	M3a_VULA_(FTTC)	M3a_VULA_(FTTH)	M3a_VULA_(cable<3.0)	M3a_VULA_(cable>3.0)	M3a_DF	M3a_DA	M3b_2014_legacy	M3b_NGA_(FTTC)	M3b_NGA_(FWA)	M3b_2014_(FTTH)	M3b_(cable<3.0)	M3b_(cable>3.0)	M4_Active_Legacy	M4_Active_(NGA)	M4_2014_Passive
TD-LR(A)IC+		DE PL	DE PL	PL	PL	PL	DE				DE PL	DE PL	DE PL	DE PL	DE	PL			DE	DE IT	PL
BU-LR(A)IC+		AT BE HR DK EL FR HR HU IT NO	AT FR HU IT NO	BE DK HU NO	HU IT	BE DK HR HU	BE EL HR HU IT	BE EL HR HU IT			DK EL HR HU IT	BE EL HU IT SK	BE DK EL HU NO	BE EL HU IT	IT	BE DK HU IT	BE HU	BE HU	BE	BE	BE
pure LRIC (Recommendation on termination rates)	DE																				
TD-LRIC											SI										
BU-LRIC		ES CY SE SI LUES	CY LU SE	CY SE SI			CY	CY ES			CZ	SI	CY ES	CY		ES			CY LU	CY LU	CY