BoR (24) 166

BEREC Report
Regulatory Accounting in Practice 2024

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List of Abbreviations

A

AD *Access Directive*

ADSL *Asymmetric Digital Subscriber Line*

B

BB *Broadband*
BWA *Broadband Wireless Access*

C

capex *capital expenditure*
CAP-M *Capital Asset Pricing Model*
CCA *Current Cost Accounting*

D

DEA *Digital Economic Agenda*
DOCSIS *Data Over Cable Service Interface Specification (International Telecom Standard)*
DSL *Digital Subscriber Line*

E

EECC *European Electronic Communications Code*
ERT *Economic Replicability Test*
EWG *Expert Working Group*
EFTA *European Free Trade Association (Member countries: Iceland, Liechtenstein, Norway, Switzerland)*
EU *European Union*

F

FDC *Fully Distributed Costs*
FLLU *Fiber Local loop unbundling*
FTTB/C *Fibre to the Building/Curb*
FTTH *Fibre to the Home*
FTTx *Fibre Connection to x*

H

HCA *Historic Cost Accounting*
HFC *Hybrid Fibre Coax*

L

LLU *Local Loop Unbundling*
LR(A)IC *Long Run (Average) Incremental Cost*
LRIC *Long Run Incremental Cost*
LTE *Long Term Evolution (3rd Generation Mobile Standard)*

M

MDF *Main Distribution Frame*
MST *Margin Squeeze Test*

N

NDCM *Non-discrimination Obligations and Costing Methodologies*
NRA *National Regulation Authorities*
NGA *Next Generation Access*

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)*
SLU *Sub Loop Unbundling*

T

TD *Top Down*

V

VULA *Virtual Unbundled Local Access*
VHCN Very High Capacity Networks
VDSL *Very High Speed Digital Subscriber Line*

W

WACC *Weighted Average Cost of Capital*

1. Executive summary

This is the twentieth RA annual report which summarises the findings of a detailed survey of regulatory accounting systems in the regulatory context in access markets across Europe. Information has been gathered from National Regulatory Authorities (NRAs) and covers the implementation of regulatory cost accounting methodologies in the national market situations. As is 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 focusing on the implementation of the corresponding European Commission WACC Notice on the calculation of the cost of capital for legacy infrastructure.

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 (former Market 3a/2014, now market 1/2020), Wholesale Central Access (Market 3b/2014) and Wholesale high quality access (former Market 4/2014, now market 2/2020).

In line with the last reports it 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 annualization methodologies provided by respondent NRAs. As in last year's report, accounting information for specific products in Market 1, such as copper access (including LLU, SA, SLU), fibre access (FLLU, VULA), dark fibre access and duct access have been further analysed; with respect to last year's report separate information on fibre sub-loop unbundling (FSLU) and pole access have been included.

An evaluation of the implementation of the Recommendation 2013/466/EU on consistent non-discrimination obligations and costing methodologies (NDCM) is also reported (par. 3.5). In this context some new elements about BU models are reported. The NDCM has been updated and substituted in February 2024 by the new Gigabit Recommendation[1], but as the cut-off date for this report was 1st April 2024, the majority of decisions were still referring to the NDCM. Also, the report monitors some new elements provided for in the new Gigabit Recommendation providing new elements on the general regulatory context.

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 1. The WACC chapter summarises the main methodologies currently used by NRAs and

[1] 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). On 23rd February 2023, the European Commission invited BEREC to provide the Commission with an opinion on the draft "Gigabit Recommendation", and BEREC published its Opinion on the 5th May 2023 with decision BoR (23) 83. The Recommendation (EU) 2024/539 on the regulatory promotion of gigabit connectivity (Gigabit Recommendation) was published on 19th February 2024.

sets out the reasons behind the estimation of single parameters needed to evaluate the cost of capital under the CAP-M model. The main focus this year report is related to the adoption of the Commission Notice on WACC.

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 2024 provides an analysis more oriented on single products (increasing the scope of monitoring) with respect to the previous editions. The 2024 report collects information on 19 main products, two more than the 2022 and 2023 reports (they were 13 in 2015), as reported in Figure 2, taking into account a separate view of underground civil infrastructures (ducts) and aerial civil infrastructures (poles), as well as including separate information on access to the fibre sub loop unbundling with respect to previous years.

The regulation of legacy products in market 1/2020 and 3b/2014 is more frequent: 60% (2023: 81%) of EU NRAs still maintain SMP remedies on ULL and 50% on market 3b over legacy copper network (reduced from 63% compared to last year's report). There is a substantial decrease of the number of NRAs that regulate services on copper products that become less and less relevant (ULL, SLU and BTS legacy). A more stable situation can be found in access market based on NGA/VHCN, with only a few NRAs having removed the regulation since 2021 and others that have started regulating new access products, including duct access. The regulatory obligations have been removed consistently for the legacy terminating segment products (market 2), due to the advanced decommissioning of the legacy technologies like PDH and SDH.

Concerning VHCN products, where regulatory obligations become less common over time, a reduction trend is not evident and it seems that regulatory obligations are adjusted in light of different investment dynamics and needs. The SMP regulatory remedies have been applied by NRAs generally towards a single national SMP operator. In some cases, the SMP regulation has been applied to more than one SMP operator.

Civil infrastructures access is the main regulatory instrument in some countries and this is the case where VHCN networks are already widespread and copper based NGA service is not present, or where symmetric framework is in charge as main instrument of regulation. In general, where the regulatory framework is mainly based on passive access products the market is also more concen-

trated. In some group of countries where infrastructure competition is the main instrument of competition, SMP regulatory framework, even if still present, provides only an indirect competitive constraint. Full deregulation or reduced regulatory pressure are present when there is efficient infrastructure competition; this is the case mainly where cable is more wide spread or where a wholesale only model is present as a competitor.

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 in comparison to last year for most markets/products. More than 50% of NRAs that regulate market 1 apply a geographical approach to regulation (last year this was less than 50%). The increasing trend prevails notwithstanding the deregulation cases of the corresponding product. Looking at geographically differentiated regulation, the deregulated areas range from 5% of households up to 95% for local and central access products, more often between 20% and 50%, increasing in comparison to last year's report.

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-Fig. 19).

ERT price control methodology is still mainly used complementarily to cost orientation, albeit an 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 Art. 74 of 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, more flexibility is granted when regulating FTTH, also with the application of ERT. 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 markets as well as on the level of the price flexibility tool according to Art. 74 of the Code, irrespective of 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 higher in relative terms in case of VULA (FTTH) as well as for market 3b/2014.

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 duct access, specifically for legacy reusable legacy infrastructure, but has been decreasing since last year. There is no "transition" from LR(A)IC to FDC.

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.

A more in deep analysis on the application of the regulatory framework of the NDCM Recommendation, also in light of the new Gigabit Recommendation, have been carried out. The survey shows that the Recommendations provide enough flexibility for NRAs to consider the most appropriate regulatory approach to promote investment and take up of VHCN in light of specific national conditions.

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 2024 (BoR (23) 102), 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)[2] 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 II of Ch. 5) by NRAs from a long time prior to the WACC Notice.

By taking into account only the most recent estimation over 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 for explaining differences between WACC values applied by NRAs until recently has become less relevant. Tax, which is a country parameter, not under NRAs control, has become more relevant in explaining differences with respect to ERP since last year. This result confirms 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. At the same time beta is becoming more relevant for explaining the difference in WACC values between NRAs due to asynchronous update of the parameter and due to the fact that contrary to the past the variation of this parameter is more relevant than before. This also shows that the application of the WACC Notice continues to have a material convergent effect.

[2] Cf. BoR (13) 110.

Overall the 2024 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 clearly convergence in the application of the 2013 Recommendation on consistent non-discrimination obligations and costing methodologies. In 2025 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 further adapted in the light of the EECC provisions given that the EECC were to be transposed by Member States by 21st 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 Commission WACC Notice will be followed on.

2. Introduction

2.1 Background

The BEREC RAMM WG 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 for SMP operators 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 an updated benchmark on regulatory accounting at a single access product level; and ii) to give an overview on how the supply and demand factors may affect the choices of the regulatory framework specifically on price control and costing methodology as adopted by NRAs.

The actual trend in the regulatory practice sees a reduction of intervention of ex ante regulation over time. Regulatory obligations, in fact, must be proportional and entail minimal restrictions of company behaviour necessary to address competition problems in the market and to achieve the framework's objectives (proportionality principle). In particular, the European Electronic Communications Code (EECC) gives NRAs powers to impose obligations concerning: (a) transparency, (b) non-discrimination, (c) accounting separation, (d) access to, and use of, specific network facilities, (e) access to civil engineering, and (f) price control and cost-accounting obligations. The implementation of the regulatory framework, under the principles of convergence with antitrust and proportionality, was expected to generate a wave of pro-competitive regulation, with an initial drastic increase of regulation intensity followed by a progressive attenuation. Intensity of regulation is a variable depending on the scope of regulation.

At the beginning, the scope of regulation has been extensive due to the pervasiveness of incumbent market power in many of the markets susceptible to ex ante regulation. After years of application of ex ante regulation, some regulatory obligations have been progressively waived, and the residual measures are becoming increasingly light-handed, reducing the intensity of regulation, as healthy market dynamics and empowered consumers become gradually able to discipline the market. Consistent with this vision and expectations, in 2003 almost all upstream and downstream retail market segments were identified by the European Commission as susceptible of market regulation and were regulated in almost all European countries. Later, the number of markets that required such market reviews has progressively fallen from 18 to 2[3]. The other market segments, including all downstream retail markets, have been declared effectively competitive. Hence, currently, with some national variance, ex-ante regulation has been limited to a few key wholesale upstream infrastructure bottlenecks, such as fixed telecom access and call termination and in some cases, civil infrastructures.

The report provides high level information on the implementation of the access remedies including price control and cost accounting obligations, taking into account the information provided by NRAs on the implementation of the regulatory framework with reference to VULA/Fiber LLU/ bitstream and civil infrastructure access on NGA/VHCN networks. This description is relevant to understand the consistency in the implementation of the European wholesale regulatory framework in terms of technical, commercial and economic offers. It looks at how much the differences in technical and

[3] Commission Recommendation (EU) 2020/2245 on relevant product and services markets within the electronic communications sector susceptible to ex ante regulation

economic terms may play a role for cross border operators to replicate a corresponding business model in different countries.

This is the twentieth annual report summarising the results of the 2024 survey.

The report has been updated since 2005 in order to monitor trends in the degree of harmonisation of regulatory accounting systems across Europe (from the first rounds of the market analysis according to the 2003 Recommendation defining 18 relevant markets to measures adopted according to the 2007 and 2014 Recommendations that have reduced the number of markets susceptible to ex ante regulation). The report thus – over time – focused gradually on a lower number of markets[4].

The current Recommendation (EU) 2020/2245 on relevant markets has been issued on 18st Dec. 2020 (C(2020) 875), identifying 2 relevant markets. In this report the taxonomy of this Recommendation on relevant markets is considered, providing, when needed, the corresponding old taxonomy thus markets and products refer also to the Commission Recommendation of 2014 (2014/710/EU).

Since 2013, the report focuses also on how NRAs implement the principles of the Commission Recommendation on consistent non-discrimination obligations and costing methodologies (NDCM)[5], that has been updated and substituted in February 2024 by the new Gigabit Recommendation[6].

In line with the trend of previous years, even if the focus of the report is traditionally based on the Regulatory accounting measures, it is a matter of fact that the regulatory scope, outlined by the EECC (Directive (EU) 2018/1972), is evolving and price control and costing methodologies are regulatory tools that are going to become less central with respect to the past if considered as stand-alone remedy. In this context a clearer view to technical, economic and commercial levels of the wholesale products available on an EU level is relevant within the scope of the present report to better understand the way price control and cost accounting remedies are imposed.

[4] Previous years (2005-2021):
- 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.
- BoR (20) 210 Regulatory accounting in practice 2020.
- BoR (21) 161 Regulatory accounting in practice 2021.
- BoR (22) 164 Regulatory accounting in practice 2022
- BoR (23) 196 Regulatory accounting in practice 2023.

[5] "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 26th 2013, cf. Document BoR (13) 41.

[6] 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). On 23rd February 2023, the European Commission invited BEREC to provide the Commission with an opinion on the draft "Gigabit Recommendation", and BEREC published its opinion on the 5th May 2023 with decision BoR (23) 83. The Recommendation (EU) 2024/539 on the regulatory promotion of gigabit connectivity (Gigabit Recommendation) was published on 19th February 2024.

For this reason, the report will focus on the application of “regulatory accounting” measures in the general context in which remedies are applied.

Moreover, the EECC specifically introduced new objectives for ensuring connectivity and widespread availability of very high capacity networks (VHCN). Thus, the regulatory context has become more complex also in light of the specificity of each country in terms of technology adopted by the SMP operator for upgrading the legacy network and the level of infrastructure competition reached that may moderate the scope of regulatory intervention.

Those specificities, that are related to structural issues and commitments, started to influence the relevant remedies as well as the scope of the regulatory intervention in each country. In this context the report provides an overview of the regulatory outcomes at single country level giving information also on the technology and competitive environment in which the remedies are imposed.

2.2 Current report

Following the traditional approach, the report provides an update on the status of costing methodologies in use across Europe and it monitors the evolution over time as a consequence of the adoption by NRAs of decisions regarding market analyses.[7] A first part of the document reports the remedies framework for each EU country in combination with the state of play of the technology adoptions and level of competition. A second section reports statistical analysis on costing methodology: the most frequent approach should be seen as the most frequent situation at European level, being aware that this doesn’t mean that it is the most appropriate solution for each country case. Instead, the statistical analysis on the most frequent approach can provide information on the regulatory paths that are emerging at EU level.

In line with past years the 2024 RA Report has been collecting information on the following main elements:

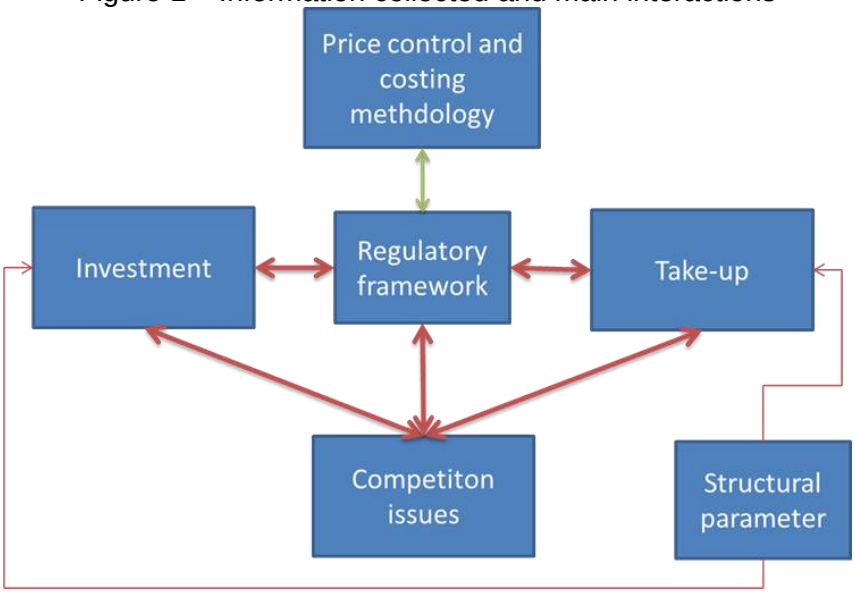
i) Regulatory framework (Access regime/geographical regulation);
ii) Cost assessment (cost orientation implementation; wholesale price; WACC and risk premium);
iii) Competition indicators (i.e. market share of SMP operators);
iv) Structural Parameters.

The following picture provides information about the main groups of elements/indicators that have been collected in the survey and the corresponding interaction diagram.[8]

[7] 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.

[8] The boxes connected with bold arrow include indicators that generally directly guide 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 target topic of the present report.

Figure 1 – Information collected and main interactions



The report benefits from information collected from 30[9] 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 1st April 2024).

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. At the same time, it should be considered that in line with the Commission recommendation on relevant markets, along the cyclical review, the number of markets is reduced due to the fact that ex-ante regulation has been removed for most of the previous relevant markets. Going forward, the objective is that NRAs will ultimately be able to find retail markets to be competitive even in the absence of wholesale regulation. In this context, more soft regulatory models emerge such as commercial agreements, also in combination with regulated products, co-investment schemes, joint ventures for rolling out VHCN and wholesale only models, which are relevant in the updated market assessment.

The level of competition in most European countries has reached at least the “local” level of the ladder of investments even if in countries with small extension the demarcation between local and central access service is less relevant specifically in NGA/VHCN transition and in those countries the central access market is still relevant.

In that context investments in VHC network are increasing in most EU member states even in the form of parallel networks, with some countries already having reached the final step of removing

[9] For LU past year data have been used.

the ex-ante regulation including the civil infrastructure access provided that the Broadband Cost Reduction Directive[10] regime is enough to address the need of infrastructure competition at least at a point of interconnection.

The transposition of the EECC (Directive 2018/1972/EU) was due on the 21st December 2020 and led to each member state introducing new instruments to address the issue of incentivising investments in VHC networks in a context where competition issues have been well addressed with a different scale for two decades of regulation. The new framework invites NRAs to incentivise infrastructure competition where this is efficient, while relying on other competitive instruments, where appropriate. Together with the classical access regulation, the EECC provides instruments such as i) the civil infrastructure access as an independent remedy (Art. 72); ii) symmetric regulation (Art. 61); iii) co-investment agreements (Art. 76); iv) commitment for co-investment agreements (Art. 79)[11], v) wholesale only operators (Art. 80). All those new instruments provide rules for reducing the classical full ladder model - cost oriented obligation - with the objective to spur investment in VHC networks. At the same time the Commission recommendation on relevant markets suggests considering specific geographical situations.

In Art. 61 (3) subparagraph 1 of the EECC, NRAs may impose obligations – upon reasonable request and regardless of any findings of 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 elements, the standard Significant Market Power (SMP) regime still remains the key instrument for *ex ante* regulation and the main focus of the present report.

Alongside the Code of Communication, it is also relevant to point out specific topics of the new Gigabit Recommendation (EU) 2024/539 (C(2024)523). The new Gigabit Recommendation focusses the scope on the access market 1/2020 in line with the updated Recommendation (EU) 2020/2245 on relevant product and service markets susceptible to ex ante regulation and eventually to the markets that are upstream and downstream of this access market (civil infrastructure access and previous market 3b “wholesale central access”). Some elements of the Commission Recommendation of 2013/466/EU remain unchanged in the new regulatory scope of the Gigabit Recommendation, inter alia:

[10] Broadband Cost Reduction Directive 2014/61/EU, now replaced by the Gigabit Infrastructure Act (Regulation (EU) 2024/1309) published in the OJ of 8th May 2024.

[11] Commercial agreements should be taken into account when a market analysis is done and NRAs should evaluate how they can affect the regulatory framework in terms of SMP assessment and consequently remedies imposed overcoming the price control obligation.

1. The fact that the legacy product should be priced based on cost orientation through a BU-LRIC+ approach providing an anchor for the VHCN network to provide a neutral efficient make or buy signal to the market;

2. Flexibility of VHCN network when some conditions are also met on a non-discrimination basis.

3. Relevance of the civil infrastructure access to spur efficient infrastructure competition.

With this in mind the present report provides an evolved picture on the implementation of the costing methodologies considered in the Recommendation of 2013/466/EU that are also valid in the new Gigabit Recommendation, with respect to previous years' current RA reports. It will address the compliance of the remedies regulatory framework with respect to the regulatory framework addressed by the new Recommendation of the Commission.

The 2024 report collects information on 19 main products (2 more than in the 2023 report), as reported in Figure 2, taking into account a separate view of underground civil infrastructures (ducts) and aerial civil infrastructures (poles), as well as including separate information on access to the fibre sub loop unbundling with respect to previous years.

The report is targeted on SMP ex ante framework focussing on the monitoring process of the products enumerated in Figure 2, in line with the collected information. At the same time, it is relevant to understand if and how the new instruments provided in the EECC are applied and considered: i) symmetric regulation (Art. 61 (3)); ii) co-investment (Art. 76); iii) functional and voluntary separation (Art. 77, 78); iv) commitments for co-investment agreement (Art. 79); v) wholesale only operators (Art. 80).

In the report some new elements provided for in the new Gigabit Recommendation are monitored providing new elements on the general regulatory context.

There is evidence that cooperative and commercial agreements are considered by NRAs, affecting the regulatory outcome independently from the application of the legal basis of the Code.

The survey asked about some of the previously enumerated elements.

Figure 2– Products monitoring perimeter

Products investigated	Definition
Terminating segment (in line with definition of Art. 61 (3)) symmetric regulation	Symmetric access to wiring and cables and associated facilities inside buildings or up to the first concentration or distribution point
Terminating segment (point beyond the first concentration point Art. 61 (3)) symmetric regulation	Symmetric access to wiring and cable and associated facilities beyond the first concentration point
Copper_ULL	SMP Local loop unbundling service on copper network
SLU	SMP Sub loop unbundling on copper network
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
Fiber LLU	SMP fiber local loop unbundling
Fiber SLU	SMP fiber Subloop unbundling
VULA (FTTC)	SMP VULA on fiber to the cabinet network
VULA (FTTH)	SMP VULA on fiber to the home network
VULA (cable Docsis >3.0)	SMP VULA on cable docsis >3.0 network
DF	SMP Dark fiber
DA	SMP Duct access
Pole access	SMP Pole civil infrastructure access
Bitstream_legacy_services	SMP Bitstream access over legacy copper network
Bitstream_NGA_FTTC	SMP Bitstream access over NGA FTTC network
Bistream _NGA_FTTH	SMP Bitstream access over FTTH network
Bitstream_Cable docsis >3.0	SMP Bitstream access over cable docsis >3.0
Leased_lines_Active_Legacy	SMP Terminating segment over copper network
Leased_lines_Active_NGA	SMP Terminating segment over NGA network

Source: BEREC RA Database 2024

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) [12]. 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.

[12] 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.”

Symmetric regulation affecting the terminating segment, in line with past reports, is applied by 9 NRAs (ES, FR, HR[13], HU, IT, LV, PT, PL, SE) 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 5 NRAs (FR, HR, HU, PL, SE).

The symmetric obligation has been considered a complement of the SMP regulation of the terminating segment for HR, HU, IT, LV, PL (since this year's report) as also SMP remedies are applied; 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 four NRAs (HR, HU, PL, SE) of the five 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 where FR has defined a separate market for duct infrastructure access including poles since 2020. It includes provisions that facilitate co-investment between operators.[14] 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 1 for the mass market.[15]

In ES CNMC adopted a decision in 2009 imposing symmetric regulation, where the first operator deploying the fibre local access segment within a building (i.e. the segment of an NGA network that connects end-user premises to the first distribution point) must make it available to third parties at reasonable prices. The decision was adopted on the basis of provisions in Spanish law that were similar (but not identical) to those existing under the regulatory framework at that time (i.e. Article 5 of the Access Directive and Article 12 of the Framework Directive), and which enabled the NRA to impose, in exceptional circumstances, symmetric obligations on operators regardless of their SMP status. As a consequence, access to the fibre local access network available within buildings is excluded from the scope of SMP regulation in market 1, since it is already covered by the symmetric obligations imposed by CNMC in 2009.

In IT AGCOM has adopted the symmetric framework for in-building wiring since 2013, in parallel with SMP regulation, using as legal basis the Article 5 of the Access Directive and Article 12 of the

[13] In 2023 HR adopted some measures within the scope of art. 61(3) concerning the symmetric access point and physical infrastructure within residential and commercial buildings in Croatia. The measure defines rules for technology neutral and rational use of free space in in-building infrastructure. The measure obliges owners of the in-building infrastructure, who are at the same time providers of electronic communications services, to establish a data base of in-building infrastructure and to publish a Reference Offer for access seekers. The measure proposes to prescribe rules for the maintenance of the in-building infrastructure and for consolidation of the existing one. The measure does not propose prices to be applied.

[14] Recurrent access prices are reduced in combination with the level of investment covered.

[15] 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.

Framework Directive. The symmetric framework also covers the civil infrastructure between the first manhole outside the private property and the access point of in-building wiring in fibre.

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 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).

General remedy application

In Figure 3 the updated remedies applied in the context of the SMP regulation at single product level is shown. The number of NRAs that apply SMP regulation for the corresponding product/market is provided, considering: i) all NRAs (EU and non-EU: 30 NRAs)[16] and ii) only EU NRAs (27 NRAs) that have provided information. The regulation of legacy products in market 1 and ex market 3b/2014 is still more frequent (even with a decreasing percentage in comparison with the previous year): 60% (81%) of EU NRAs still maintain SMP remedies on ULL and 50% (63%) of NRAs on market 3b/2014 legacy copper network still regulate the product in the market. With respect to regulatory remedies for VHCN network (FLLU- VULA-H) the SMP ex ante access regulation is not decreasing.

Two NRAs do not have an SMP (NL and RO) in the analysed products/ markets due to the fact that all markets have been found to be competitive.[17] Since 2023, one more NRA (AT) has removed SMP regulation in market 1 and ex. 3b, due to the availability of commercial offers provided by the (former) SMP operator, therefore it was concluded that the three criteria test was no longer fulfilled. Also, large geographic parts of the residential market (most of the urban areas) were found to be competitive due to infrastructure-based competition from cable networks and competitive constraint from mobile broadband.

Since last year BG, who have previously assessed all access market as competitive, have defined a civil infrastructure market with an SMP at national level. This is due to the fact that CRC's assessment shows that the competitive environment under the currently available symmetrical regulation (BCRD) is diminishing, "*as the existing symmetric regulation is not effective enough to provide stable and clear conditions for operators that have deployed or intend to deploy their own electronic communications networks. CRC is concerned that the frequency and outcomes of dispute resolution regarding the access to physical infrastructure create uncertainty in the market for the undertakings that rely on regulated access" (case BG/2024/2521).*

In the 2024 report, the products that are regulated in each market are shown. In the table below the relevant market in which the specific product is regulated, in combination with the time of the market review, is also provided.[18] The civil infrastructures market has been defined in five countries

[16] LI, NO, RS as not EU countries that this year provided information.

[17] 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.

[18] Although in most cases the remedies definition and market analysis definition are at the same stage, remedies may be imposed at different times. The NRAs have provided information on the last market review relevant for the corresponding remedy framework.

(BG, FR, IE, LV, PT), in all other cases the civil infrastructures access has generally been regulated in market 1.[19] The definition of the relevant market for civil infrastructures may be found, either where symmetric regulation is in charge (FR), or in combination with passive remedies, such as FLLU (LV) or when access to civil infrastructures has been the principal instrument of regulation for a long time (PT) and deregulation of the downstream market is strictly dependent on civil infrastructures availability. For (BG) the situation is related to the national condition in light of enforcement of the BCRD with a single nation-wide SMP in the civil infrastructure access market. In IE the civil infrastructure market[20] is defined in combination with VULA regulation when fiber LLU is removed from the regulatory framework. In the latter case, the objective is to define a long run evolved framework to give the opportunity to the OAO to deploy, where efficient, their own VHCN infrastructures where FLLU is not feasible or relevant. In all those cases underground and arial infrastructure are regulated in the same civil infrastructure market.

When civil infrastructure access is regulated in market 1, pole access is not always included in the access remedy (BE[21], EE, HR, LI, LT, RS, SI, SK) while only underground civil infrastructure access is considered.[22]

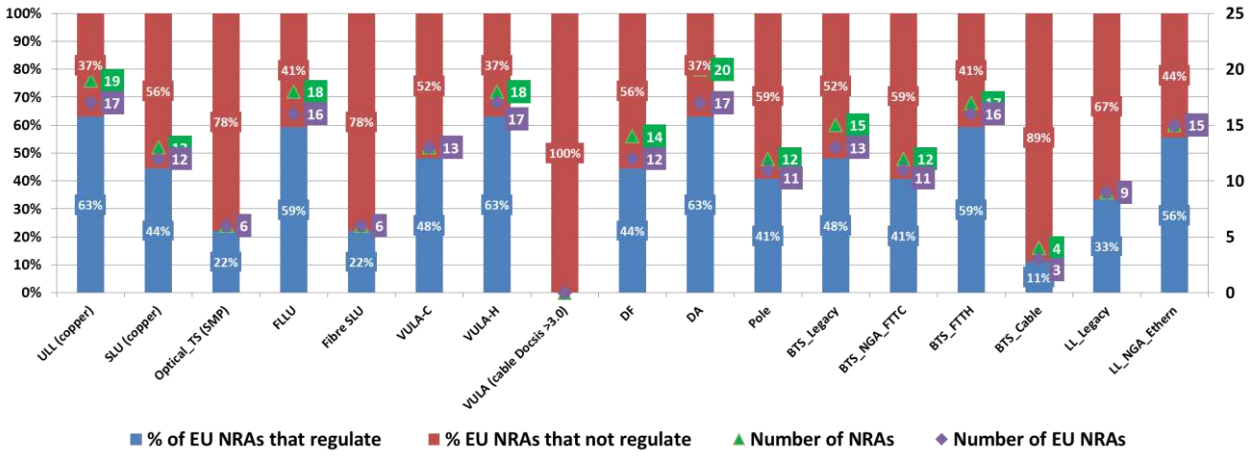
Concerning civil infrastructure access, SMP obligation on DA/poles in combination with other regulatory remedies are missing only in some specific countries such as CZ where the incumbent is vertically separated, in FI where numerous SMP local operators are present, or where VHCN infrastructures are widely deployed through municipal networks (SE), or where specific geographical situations do not allow the deployment of more than two independent networks (MT, LU, DK).

Bitstream services have been regulated within market 1 in LT and PT (only for FTTH). VULA is regulated in former market 3b in EE and MT, but in those cases the market reviews date back to 2017.

Fibre Sub-loop unbundling is regulated in 6 countries (CZ, FI, HR[23], IT, LV, PL). In IT the access obligation has been imposed in light of availability of P2P fibre deployment from the street cabinet where an own OAO FTTC solution based on SLU on copper was a solution.

[19] A more detailed overview of physical infrastructure regulation can be found in the BEREC Report on the regulation of physical infrastructure access, BoR (24) 178, published in Dec. 2024.
[20] In case of IE Dark Fibre since 2024 is regulated as part of the new PIA (civil infrastructure) decision. Dark Fibre has to be provided by the incumbent where there is no PIA and where Dark Fibre is reasonably available.
[21] Poles generally belong to utility operators in BE and the Broadband Cost Reduction Directive is the right legal framework to access this infrastructure.
[22] In ES the access to civil infrastructure (underground and poles) is regulated in market 1 and market 2.
[23] Fibre SLU is an FA PON service. Due to the FTTH network infrastructure, it is the sole available service in the Republic of Croatia.

Figure 3 - SMP-regulatory obligations per access service (the name of NRAs and year of latest market review is reported in the associated table[24])



	ULL (copper)	SLU (copper)	Optical_TS (SMP)	FLLU	Fibre SLU	VULA-C	VULA-H	DF	DA	Pole	BTS_Legacy	BTS_NGA_FTTC	BTS_FTTH	BTS_Cable	LL_Legacy	LL_NGA_Ethern
Market_1_local_access	(BE-2018) (CY-2022) (CZ-2023) (DE-2019) (EE-2017) (EL-2023) (ES-2021) (FI-2018) (FR-2023) (HR-2023) (HU-2017) (IT-2024) (LT-2019) (LU-2020) (NO-2018) (PL-2019) (RS-2022) (SI-) (SK-2018)	(CY-2022) (CZ-2023) (DE-2019) (EL-2023) (ES-2021) (FI-2018) (FR-2023) (HU-2017) (IT-2024) (LT-2019) (LU-2020) (NO-2018) (PL-2019)	(HR-2023) (HU-2017) (IE-) (IT-2024) (LV-2024) (PL-2019)	(BE-2018) (CZ-2023) (DK-2021) (EE-2017) (FI-2018) (HR-2023) (HU-2017) (IT-2024) (LI-2023) (LT-2019) (LU-2020) (LV-2024) (NO-2018) (PL-2019) (PT-2023) (SE-2015) (SI-) (SK-2018)	(CZ-2023) (FI-2018) (HR-2023) (IT-2024) (LT-2019) (PL-2019)	(BE-2018) (CY-2022) (CZ-2023) (DE-2019) (EL-2023) (FI-2018) (HR-2023) (HU-2017) (IE-2024) (IT-2024) (SI-) (SK-2018)	(BE-2018) (CY-2022) (CZ-2023) (DE-2019) (EL-2023) (ES-2021) (FI-2018) (HR-2023) (HU-2017) (IE-2024) (IT-2024) (LU-2020) (LV-2024) (NO-2018) (SI-) (SK-2018)	(CZ-2023) (DE-2019) (EL-2023) (FR-2023) (HU-2017) (IT-2024) (LI-2023) (LT-2019) (PL-2019) (RS-2022) (SI-)	(BE-2018) (DE-2019) (EE-2017) (EL-2023) (ES-2021) (HR-) (HU-2017) (IT-2024) (LI-2023) (LT-2019) (NO-2018) (PL-2019) (RS-2022) (SI-) (SK-2018)	(DE-2019) (EL-2023) (ES-2021) (HU-2017) (IT-2024) (NO-2018) (PL-2019)			(LT-2019) (PT-2023)			
Market_3b_2014_central access						(EE-2017)	(EE-2017) (MT-before 2013)				(BE-2018) (DE-2020) (EE-2017) (EL-2023) (ES-2021) (FI-2018) (FR-2023) (HU-2017) (LT-2019) (LU-2020) (NO-2018) (PL-2019) (RS-2023) (SI-)	(BE-2018) (DE-2020) (EE-2017) (EL-2023) (FI-2018) (HR-2023) (HU-2017) (LU-2020) (PL-2019) (RS-2023) (SI-) (SK-2018)	(BE-2018) (DE-2020) (DK-2021) (EE-2017) (EL-2023) (ES-2021) (FI-2018) (HR-2023) (HU-2017) (LU-2020) (LV-2024) (PL-2019) (RS-2023) (SI-) (SK-2018)	(BE-2018) (DK-2021) (HU-2017) (RS-2023)		
Market_2_High_capacity								(AT-2023)							(BE-2019) (CY-2024) (DE-2023) (EL-2020) (ES-2022) (FR-2023) (IE-2020) (LT-2016) (SI-)	(AT-2023) (BE-2019) (CY-2024) (DE-2023) (EL-2020) (ES-2022) (FR-2023) (HR-) (HU-2018) (IE-2020) (IT-2024) (LT-2016) (LU-2020) (PT-2023) (SI-)
Civil infrastructures market								(PT-2023)	(BG-2024) (FR-2023) (IE-2024) (LV-2024) (PT-2023)	(BG-2024) (FR-2023) (IE-2024) (LV-2024) (PT-2023)						

Source: BEREC RA Database 2024

In Figure 4 the evolution of availability of regulatory remedies, at single product level, in the last four years (2021-2024) for EU NRAs, according to data availability, is reported. The percentages

[24] For DE M2 market analysis, has been finalized in summer 2024, however the decision of the new regulatory framework of remedies is still not decided and so the remedies regulatory imposed date back to 2018. CY indicated that it had imposed collocation as a remedy in the context of its ex-ante review of the markets which included all PIA (Physical Infrastructure Access) elements.

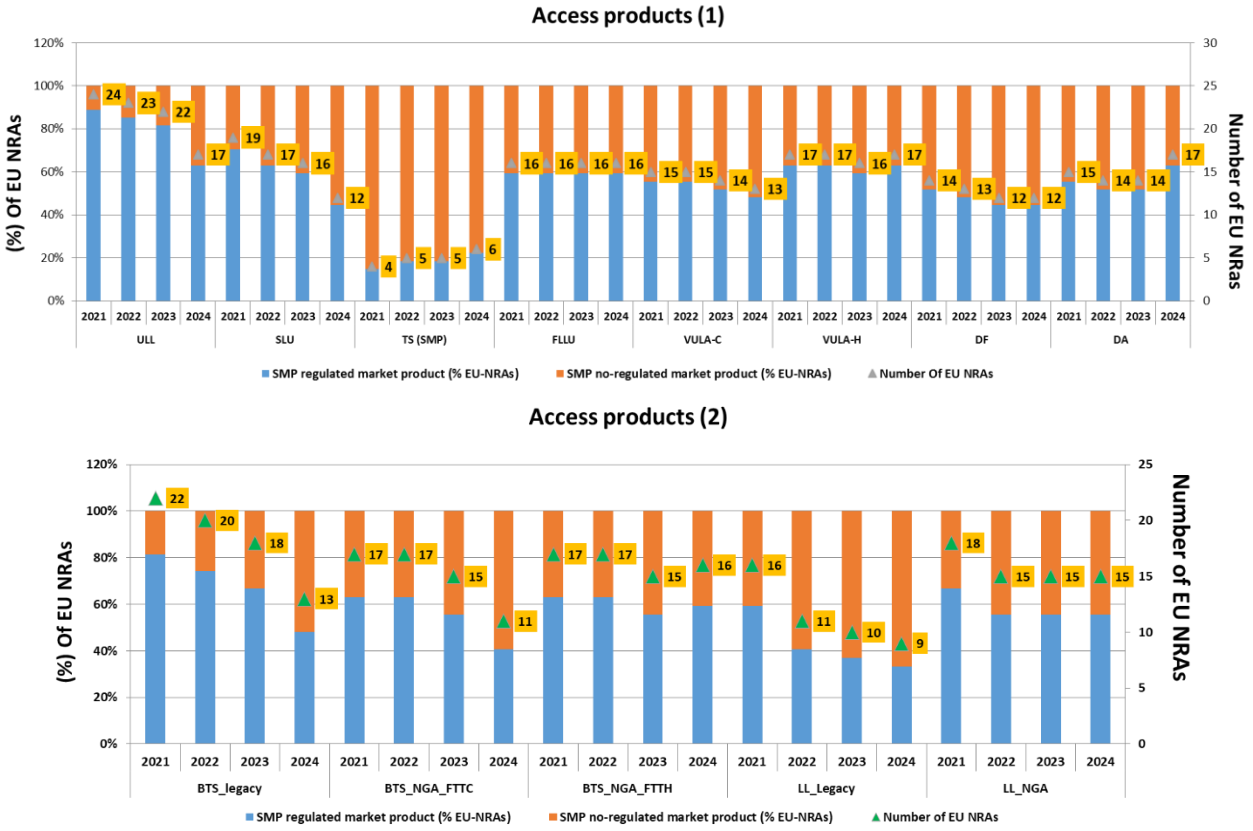
of EU-NRAs that have applied the SMP regulation for the corresponding product is provided in homogeneous terms.[25]

There is a substantial decrease of the number of NRAs that regulate services on copper products that become less and less relevant (ULL, SLU and BTS legacy).

A more stable situation can be found in access market based on NGA/VHCN, with only a few NRAs having removed the regulation since 2021 and others that have started regulating new access products, including duct access. The regulatory obligations have been removed consistently for the legacy terminating segment products (market 2), due to the advanced decommissioning of the legacy technologies like PDH and SDH.

Concerning VHCN products, where regulatory obligations become less common over time, a reduction trend is not evident and it seems that regulatory obligations are adjusted in light of different investment dynamics and needs. In some cases FLLU has been introduced (IT, PT), and removed (DE, IE); VULA-H has been enforced since the information reported in last year report in one more case (DE)[26].

Figure 4 - (a-b) SMP regulatory situation (2021-2024) (a) Access product market 1, (b) Access product markets 3b and 2



[25] Where there are differences in historical time series in comparison to previous reports they may have been adjusted in light of homogeneity of the information due to a constant improvement of data collection and validation by NRA experts.

[26] BNetzA did not impose an access obligation on VULA-H, in every case the product should be available with the objective to replicate the retail offer of the incumbent operator; therefore, strict non-discrimination obligation and transparency obligation including the publication of a reference offer in line with BEREC Guidelines on the minimum criteria for a reference offer (BoR (19) 238) have been imposed. The access obligation has not been imposed in the sense that the incumbent operator is not obliged to build up the network on request, but should allow to replicate own retail offer (Commission decisions DE/2022/2385 for VULA–H and DE/2022/2413 for Bitstream FTTH).

Source: BEREC RA Database 2024

In table 1 NRAs that have removed regulation concerning the specific product, since 2021 are reported (in parentheses the annual change is given considering the RA database time reference).[27] NRAs that have introduced the regulatory obligations since last year report are also reported. A strong trend in regulatory reduction is visible specifically for bitstream products (ex market 3b) and for FTTC access services start to be de-regulated especially when a geographical approach to regulation is not taken into account. Civil infrastructures access has increased relevance. In red are the NRAs that have modified the approach since last year.

Table 1 - NRAs deregulating specific product/market since 2021 RA report (in parentheses the year of the RA report in which changes in regulatory obbligations have been registered in the RA data base)[28]

	ULL	SLU	TS (SMP)	FLLU	VULA-C	VULA-H	DF	DA	BTS_Legacy	BTS_NGA_FTTC	BTS_FTTH	LL_Legacy	LL_NGA_Ethern
EU_NRAs that removed regulation since last three years	DK (2022); AT(2023); IE(2024);LV(2024);MT(2024);PT (2024); SE(2024)	EE(2022),HR(2022),AT(2023),LV (2024),MT(2024),SE(2024)		DE(2024) IE(2024)	AT(2023), LV (2024)	AT(2023)	DK (2022), HR (2022), LV(2024)		AT (2023), CY(2022), CZ(2023),DK (2022),IE(2024), IT(2024), LV(2024), ,PT(2024), SK (2024)	AT(2023), CY(2022), CZ(2023), DK(2024), IE (2024), IT(2024), LV(2024)	AT(2023), CZ(2023), IE(2024), IT(2024)	CZ(2022), FI(2022), HR(2022), LU(2023), MT(2022) , NL (2022), PT(2024)	CZ(2022), FI(2022), MT(2022)
NRAs that introduced the obligation since last year monitoring exercise			LV	IT, PT		DE	AT	BG, HR,PL			EL,DE, PT		

Source: BEREC RA Database 2024

Summarizing the previous tables considering NGA and VHCN (FTTH), SMP regulation also with different rules for each product as reported in the following part of the present report, has been applied by most NRAs that have provided information:

- 25 NRAs out of 30 have applied SMP regulation to FTTC and/or FTTH and one symmetric: BE, CY, CZ, DE, DK, EE, EL, ES, FI, FR[29], HR, HU, IE, IT, LI[30], LT, LU, LV, MT, NO, PL, PT, RS, SE, SI, SK.
- VULA FTTH is the most regulated service, by 18 NRAs (BE, CY, CZ, DE[31], EE, EL, ES, FI, HR, HU, IE, IT, LU, LV, MT, NO, SI, SK), as well as passive FLLU (19 NRAs: BE, CZ, DK, EE, FI, FR[32], HR, HU, IT, LI, LT, LU, LV, NO, PL, PT, SE, SI, SK)[33]
- For duct access SMP regulation has been imposed by 20 NRAs (17 EU NRAs).

[27] Comparisons with past year's report are in homogeneous terms, that is: if data inconsistencies are detected for the past years, findings are appropriately taken into account over the time series available.

[28] The year reported in the table refers to the year of modification of the information collected in the RA database (i.e 2024 means that the information changed for the 2024 RA report respect to the previous RA report, 2023 means that the information changed in 2023 RA report respect to previous RA report and so on). The date can be different from the effective year in which the regulatory obligation is lifted or introduced (also considering the cut off date of 1th April considered for the present report and on the declaration on the annual survey reported).

[29] FR is included in this group due to the fact that it applies obligation of access to the terminating segment of FTTH on a symmetrical basis as reported in the previous paragraph.

[30] LI Regulate a national FTTH/B access (fibre unbundling), effective from Jan 2024.

[31] For purpose of the present report DE is classified as one of NRAs that regulate the VULA-FTTH and BTS-FTTH in light of the new decisions DE/2022/2385, DE/2022/2413 where an enforcement of the VULA and BTS-H obligation and implementation have been introduced recently different from previous releases of the RA reports (including 2023 RA report), Moreover in the same decision DE/2022/2385 the access obligation of ULL have been excluded.

[32] FR is included in this group due to the fact that it applies obligation of access to the terminating segment of FTTH on a symmetrical basis.

[33] 12 NRAs apply both FLLU and VULA over FTTH (BE, CZ, EE, FI, HR, HU, IT, LU, LV, NO, SI, SK).

- 6 NRAs have applied regulation to NGA/VHCN products[34] only to VULA products on FTTC and FTTH networks (CY, CZ, IE, IT, MT, NO);
- 9 NRAs consider both VULA and bitstream on both FTTC and FTTH (BE, DE, EE, EL, FI, HR, HU, SI, SK);
- 5 NRAs have applied regulation only to VULA/FLLU over VHCN, (LI, MT, NO, SE, FR[35]) and 5 NRAs consider both VULA/FLLU and bitstream only over VHCN (DK, ES, LT, LV, PT) in such cases no regulation has been applied to the FTTC network.

Where no FTTC deployment is present, regulation for bitstream is in general less frequent. Market 3b/2014 is most frequently regulated where market 1/2020 products are available. The survey confirms this year that central access products (ex-market 3b) can be still relevant in some countries where virtual or physical access products at local level is imposed, but access demand remains low (BE, HR, DK, CZ[36]).

Where VULA-FTTH access is regulated, regulation in market 3b VHCN is generally more frequent in line with past year's findings: 12 of 17 NRAs (62% in 2023) regulate both VULA over FTTH and central access product over FTTH (BE, DE, EE, EL, ES, FI, HR, HU, LU, LV, SI, SK).

A specific case is DK where market 3b/2014 over FTTC is available in three main different geographical markets.[37]

In line with the last report NRAs were asked to provide information on the relevance of the SMP regulated product/market in terms of incidence of the wholesale product available on the overall outcome.

The survey asked for the weight of the regulated products to better figure out the degree by which the regulatory obligations can directly or indirectly affect the competitive outcome (table 2).

In line with past year NRAs that have considered the regulated product (excluding duct access) to be "very relevant" for the access seekers' retail competition are countries where the transition to VHCN is still in progress and/or the copper network of the incumbent is still relevant. Moreover, replies indicate that where the VHCN transition is driven by OAO investment in combination with the investment of the incumbents, a reduction in the scope of ex-ante SMP regulatory obligations on VHCN follows with respect to what happens on the legacy copper network.

NRA's replies show that the evolution of the regulatory framework takes into consideration not only the need for incentivising investment, but also the necessity to promote take-up over VHCN (this is more relevant in countries where competing technologies are present in the market, e.g. NGA vs VHCN).

[34] Independently from legacy product (LLU, SLU) regulation.
[35] FR is included in this group due to the fact that it applies obligation of access to the terminating segment of FTTH on a symmetrical basis as reported in the previous paragraph.
[36] In CZ only commercial offer is available, without SMP regulation on central access products that have been deregulated since 2023.
[37] In the most extended part (about 80% of households), the product is available on a commitment base from 4 SMP operators; in a second area it is available on an SMP basis provided by a vertically integrated operator (about 10% of households); and in a third part of the country it is available from a wholesale only operators (about 5% of households). In every case only non-discrimination and transparency obligations and no access obligations have been imposed on the SMP operators in market 3b/2014 over FTTC. A form of price control has been imposed considering benchmarking in line with the commitment price or on fair and reasonable price for the wholesale only.

Table 2 provides other information on the “relevance of the regulated product” as reported by the NRAs in combination with the number of operators that have at least 3% of the fixed retail broadband market share (when available/not confidential).[38]

In the countries where civil infrastructure access is the main instrument for competition and when a passive access framework is in charge the market outcome is more concentrated, the opposite can be visible when the regulatory framework is mainly based on active products such as VULA, providing an easier way to entry into the market (this is consistent with the findings on wider availability of bitstream access where VULA is also available).

When “not relevant” is considered as main reply for access services, the motivation is related to the fact that infrastructure competition is present and operators rely on their own-network (BG-HU-LV).

In other cases (CZ-DK) the main motivation to reply “not relevant” for a local access product such as VULA/FLLU is the availability of a commercial alternative at central access level (bitstream).

Table 2 - Relevance of the SMP market/product regulated and number of Operators with retail market share grater than 3% (from 0 to >5)[39]

	ULL (copper)	SLU (copper)	Optical_TS (SMP)	FLLU	Fibre SLU	VULA-C	VULA-H	VULA (cable Docsis >3.0)	DF	DA	Pole	BTS_Legacy	BTS_NGA_FTTC	BTS_FTTH	BTS_Cable
very relevant for competition as OAO actually use the product	0	0	0	1	0	3	3	0	1	5	2	2	1	2	1
moderate relevant as OAO actually use the product marginally	1	1	0	1	0	1	3	0	3	4	2	5	2	5	1
very relevant as OAO as can be relevant for future outcome	0	0	0	2	1	0	2	0	0	2	0	0	0	1	0
no relevant any more, but used in the past	7	2	0	1	0	0	0	0	0	0	0	4	1	1	1
no relevant	4	5	4	6	4	4	4	1	4	2	2	1	1	1	1

	ULL (copper)	SLU (copper)	Optical_TS (SMP)	FLLU	Fibre SLU	VULA-C	VULA-H	VULA (cable Docsis >3.0)	DF	DA	Pole	BTS_Legacy	BTS_NGA_FTTC	BTS_FTTH	BTS_Cable
very relevant for competition as OAO actually use the product				(LI-5)		(DE-) (IE-4) (IT->5)	(DK-) (IE-4) (NO-5)		(LI-5)	(EE-3) (ES-3) (LT-) (PT-2) (RS-3)	(ES-3) (PT-2)	(BE-) (DE-)	(BE-)	(BE-) (DK-)	(BE-)
moderate relevant as OAO actually use the product marginally	(NO-5)	(DE-)		(EE-3)		(EE-3)	(EE-3) (ES-3) (LV-2)		(AT-1) (IT->5) (RS-3)	(BG-) (IT->5) (LI-5) (NO-5)	(BG-) (IT->5)	(CZ-3) (EE-3) (LT-) (NO-5) (RS-3)	(CZ-3) (EE-3)	(CZ-3) (EE-3) (ES-3) (LT-) (LV-2)	(DK-)
very relevant as OAO as can be relevant for future outcome				(BE-) (IT->5)	(IT->5)		(DE-) (IT->5)			(DE-) (LV-2)				(DE-)	
no relevant any more, but used in the past	(DE-) (EE-3) (ES-3) (HU-4) (IT->5) (PT-2) (RS-3)	(ES-3) (IT->5)		(DK-)								(DK-) (ES-3) (HU-4) (PT-2)	(HU-4)	(HU-4)	(HU-4)
no relevant	(BE-) (BG-) (CZ-3) (LT-)	(BG-) (CZ-3) (HU-4) (LT-) (NO-5)	(BG-) (HU-4) (IT->5) (LV-2)	(BG-) (CZ-3) (HU-4) (LT-) (LV-2) (NO-5)	(BG-) (CZ-3) (HU-4) (LT-)	(BE-) (BG-) (CZ-3) (HU-4)	(BE-) (BG-) (CZ-3) (HU-4)	(BG-)	(BG-) (CZ-3) (HU-4) (PT-2)	(BE-) (HU-4)	(HU-4) (NO-5)	(BG-)	(BG-)	(BG-)	(BG-)

Source: BEREC RA Database 2024

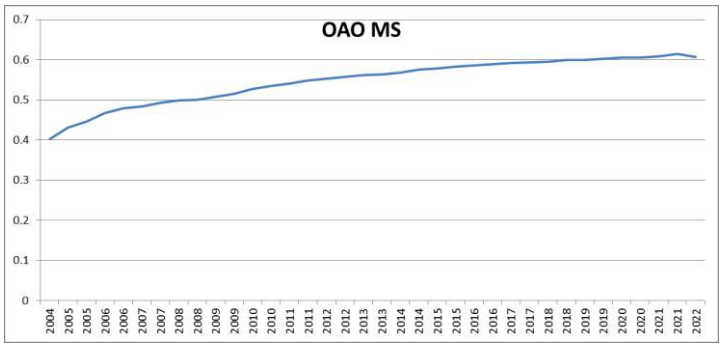
[38] This year’s report also provides some information on the level of “concentration” in the retail broadband market. NRAs were asked to specify 'How many OAOs have a retail fixed broadband market share >3%”, question independent from the specific product.

[39] The market share refers to the general retail market share not the market share reached by the product. In this picture we have only correlated the two elements of information collected: i) relevance of the wholesale product and ii) status of the market in term of concentration.

The regulatory framework in terms of SMP remedies imposed is reported in line with past years' reports.

Figure 5[40] reports the Market share of OAOs as collected from DESI at European level. Progress in retail competition may support that the scope of regulation is decreasing in most countries (also considering the constant reduction of the number of relevant markets).

Figure 5 - OAO average market share

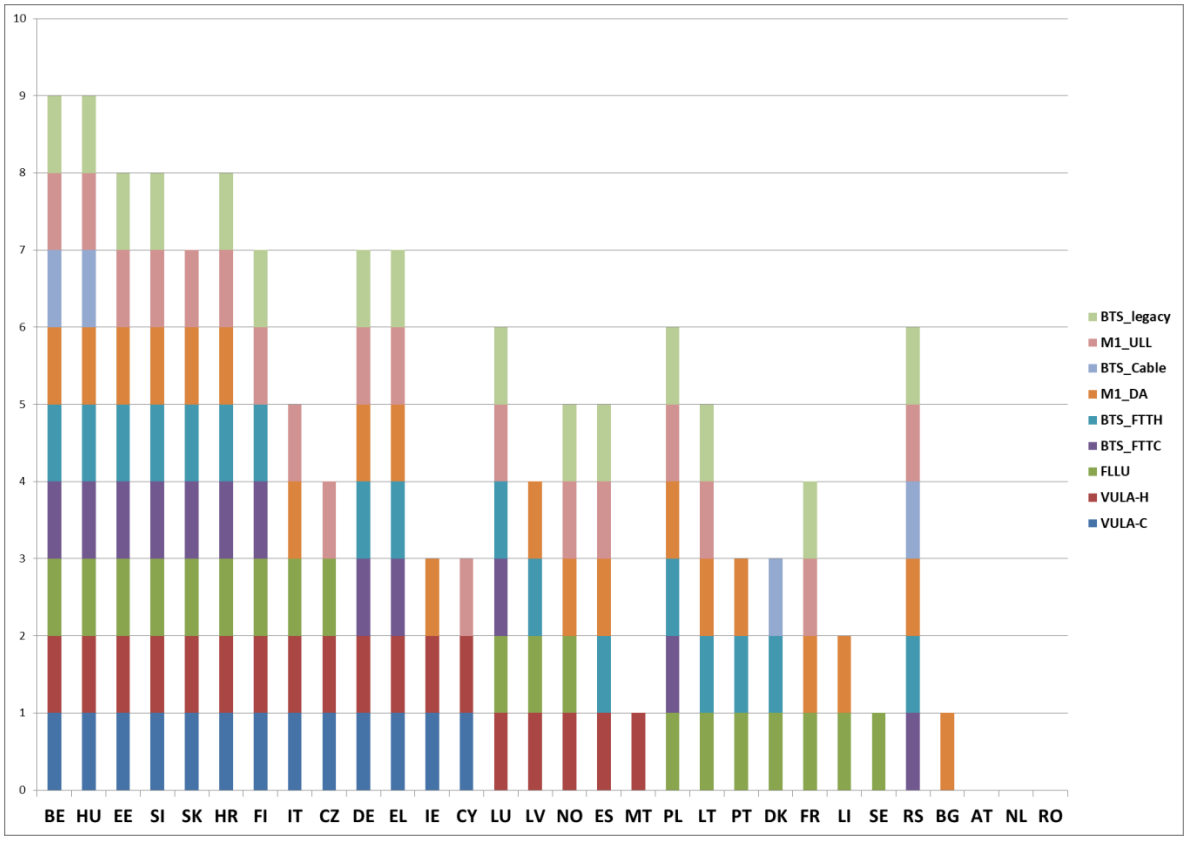


In Figure 6, in line with the last RA reports, the whole set of regulated products by the 30 NRAs that have provided information, ranked by the number of regulatory obligations (at least one) in market 1 and ex market 3b, is shown. NRAs have been ranked taking into account the following scale of product remedies: i) VULA-C; ii) VULA-H; iii) FLLU; iv) BTS_FTTC; v) BTS_FTTH; vi) M1_duct access; vii) BTS cable. ULL and BTS legacy are also shown. In most countries legacy copper products are going to be less relevant.[41]

[40] DESI indicator Market share is based on fixed broadband subscriptions (lines). New entrants mean operators that did not enjoy special and exclusive rights or a de facto monopoly for the provision of voice telephony services before the liberalisation.

[41] In FR legacy copper is still relevant in area where VHCN is not yet deployed even if regulation on decommissioning is already in charge.

Figure 6 – SMP-regulatory situation (remedies applied)



Source: BEREC RA Database 2024

Country cases are grouped (as for the last 3 Reports), taking into account the regulatory remedies imposed in combination with the main competitive and investment outcomes. Thus, countries are ranked on the basis of the regulatory pressure on the SMP operator/s, considering the proportionality principle related to obligations.

As in previous RA reports, the classification of the countries is reported in combination with main indicators on the technology outcome mainly related to the relevance of the copper network, on the NGA provision, the level of competition, by the SMP operator retail market share, the relevance of the cable network and the corresponding level of VHCN coverage.

Where VHCN, in terms of take up and coverage, is still behind the EU average, NRAs tend to provide a regulatory framework that includes all the remedies available at least in market 1, including VULA-H and/or FLLU.

For a first group of countries (BE, HU, EE, SI, SK, FI, HR, IT, CZ) where both NGA and VHCN access is mandated it is less common to focus on civil infrastructure access, and FLLU is also an option for competition in the long run. In those countries, it is also common to experience a certain level of infrastructure competition (BE, HU, IT).

In a second group of countries (CY, DE, EL, IE), the focus is mainly on FTTC regulation and four out of five main regulatory obligations for NGA are imposed on market 1/2020, and in most case also on market 3b/2014 (DE, EL). In this case VULA FTTH or FLLU are applied alternatively as the main products for VHCN obligation. In this group the cost based anchor pricing approach applied on copper based over FTTC in combination with civil infrastructures access is also adopted as a main instrument for competition.

A third group of countries (LU, LV, NO, ES, MT, PL, LI, PT, DK, LT, SE, FR[42]) sees FTTH and not FTTC as the main deployed architecture for NGA and so no specific local access obligations for FTTC have been imposed. In such cases VULA FTTH or FLLU are the SMP products, sometimes in combination or only with remedies in market 3b.

In case of PT[43] BTS_FTTH and FLLU are only ancillary in some part of the country less than 5% as the duct access is the main instrument for regulatory purposes to VHCN networks; BG started regulating a new civil infrastructure market.

The last group, AT, NL and RO[44], do not impose remedies in market 1/2020 and market 3b/2014. For DK the relevant regulation is only on market 3b product, FLLU regulation is relevant only in less than 5% of the country and commitment agreements are the main instrument of regulation.

Summing up, the first two groups include NRAs that regulate, NGA over FTTC and FTTH, and copper in markets 1 and 3b, while the second group applies lighter FTTH regulation. In the first group infrastructure competition seems to be at a more advanced stage also in a forward looking perspective and the competition based on a civil infrastructure access seems less relevant in the medium term. In three countries multiple SMPs are present (BE, FI, HU).

The third group includes NRAs that still regulate copper together with FTTH not only via duct access. The fourth group does not apply SMP regulation or it regulates legacy copper and applies FTTH regulation only based on civil infrastructure access, or through commercial agreements or commitments.

In the light of the four identified groups of NRAs, six main indicators have been considered in figure 7: i) the weight of DSL over retail BB market share (DESI Report, latest available data),[45] in order to understand the relevance of the legacy copper (including VDSL based on FTTC); ii) the SMP overall retail market share using the last DESI figure validated also with information collected in the Structural data database 2024; iii) VHCN coverage (%) as reported in the last DESI report; iv) FTTP coverage (%) as reported in the last DESI report; v) Take-up of cable and FTTP as collected in the Structural data[46].

The average values have been calculated including only EU countries (the values estimated for the group of last year are also reported in parentheses).

Results show that the first group combines a high FTTH/cable coverage (FTTC is less relevant) in combination with an intermediate stage of the SMP average market share and take-up not polarised on a specific technology (cable, copper and FTTP).

The second group of countries (IE, EL, CY, DE) is characterised by the fact that NGA over FTTC network is still very relevant and generally the competitive situation (SMP market share) is at an intermediate stage. On average a lower take-up rate of cable and FTTP is present with respect to the first group in combination with a less wide spread cable and/or VHCN coverage. In all these countries a single SMP is present and SMP regulatory obligations are generally focused on the copper network that warranties NGA services provision.

[42] FR is included in this group due to the fact that it applies obligation of access to the terminating segment of FTTH on a symmetrical basis

[43] PT applies symmetric obligation to civil infrastructure independently of the BCRD provision.

[44] In RO, ANCOM has identified in 2020 strong infrastructure competition at the retail level. The copper-based incumbent strongly competes with an alternative operator who has deployed a widespread national fibre optics network, plus there are cable networks all over the country, in general trebling the infrastructure available. The main technologies used are xDSL - ADSL/VDSL, coaxial cable - DOCSIS 3.0, UTP/FTP cable - FTTx, fibre optics - FTTH and radio/FWA.

[45] https://digital-strategy.ec.europa.eu/en/policies/desi.

[46] For confidentiality reasons, the averages of SMP market shares and other indicator are given in a range; moreover, the scope of the analysis is providing characteristic of the group not to assess the specificity of each single country.

Where two competing networks (NGA and VHCN) that are closer in the chain of substitution are managed by the SMP operator, regulatory intervention by the NRAs has to balance three main effects: wholesale revenue effects, business migration effects and replacement effects. In such situations copper prices on the legacy network for NGA can still be relevant to incentivise further investment in VCHN and take-up migration of VHCN.

In the third group of countries competition conditions are more favourable, as FTTP is already the main technology, i. e. there is no intermediate step between NGA and VHCN, but rather a direct transition from the legacy copper network to VHCN. Here, the transition to VHCN has been driven by OAO operators including municipal networks (SE[47]) or via cooperative approaches (ES, FR). SMP obligations are then focused on specific geographical areas and generally are lighter.

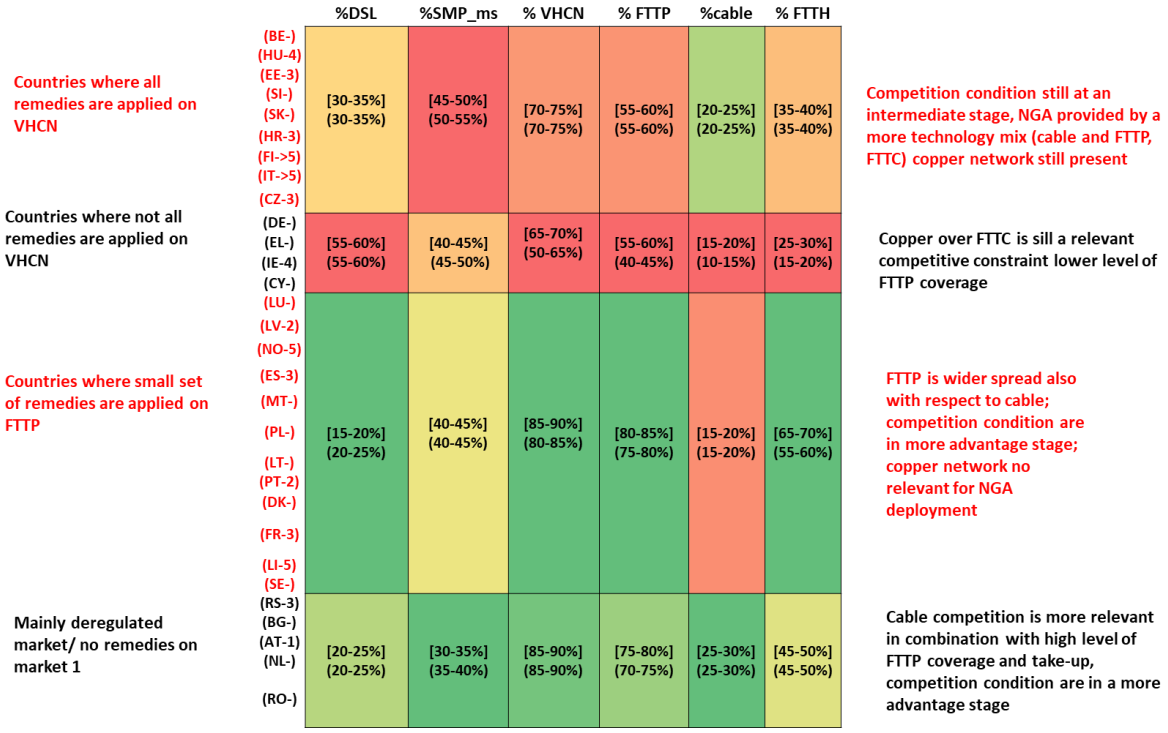
The fourth group represents specific country cases of deregulated markets. Relevant infrastructure competition by cable is present with a higher penetration of this technology on average, i. e. a more direct competitive constraint (AT, NL). FTTP is at an advanced stage both in terms of coverage and take-up in, RO, BG. Here, duct access has been considered sufficient for competition BG or full deregulation is currently in force (NL, RO); in other cases, binding commercial agreements are the preferred approach to address any potential market failure, due to the failure of the three criteria test for imposing an SMP position (AT)).

It should be noted that, on average, there is a reduction in the xDSL share in general in combination with a reduction of the market share of SMP operators. In addition, where there is infrastructure competition and/or a clear commitment to VHCN investment, for example via co-investment agreements or effective commercial agreements, the standard SMP framework is always less relevant (i.e. NL[48], FR, ES, DK). In that sense the market share of the SMP operator alone cannot explain the regulatory framework applied.

[47] For SE information at 1st of April 2024 relates to the last market analysis, which dates back to 2015. However, the copper access regulation has been lifted and the decision entered into force on 21st April 2023. For existing wholesale agreements (active lines), the obligations to offer access to the copper network shall continue to apply during a transition period of 12 months from the date of the decision.

[48] NL does not apply any regulation in 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.

Figure 7– SMP-regulatory approach vs network evolution and SMP market share.[49]



Source: BEREC RA Database 2024

The SMP regulatory remedies generally apply to a single SMP operator that can be national in scope. In some cases (BE, HU 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 1; 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.[50]

[49] In parentheses, for each country information collected and explained in the previous section, about the number of operators that have a market share greater than 3% in the retail broadband market share, is reported, providing an indication of the level of the market concentration. In relation to the cell values in brackets, those values represent the averages of the indicator for the EU countries in each group listed on the left of the table. For each group the averages stay in the reported range (lower and upper bound). This representation tries to figure out if each group of countries ranked through the remedies-based classification can be "characterized" by looking at the averages of some relevant indicators.

[50] 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

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

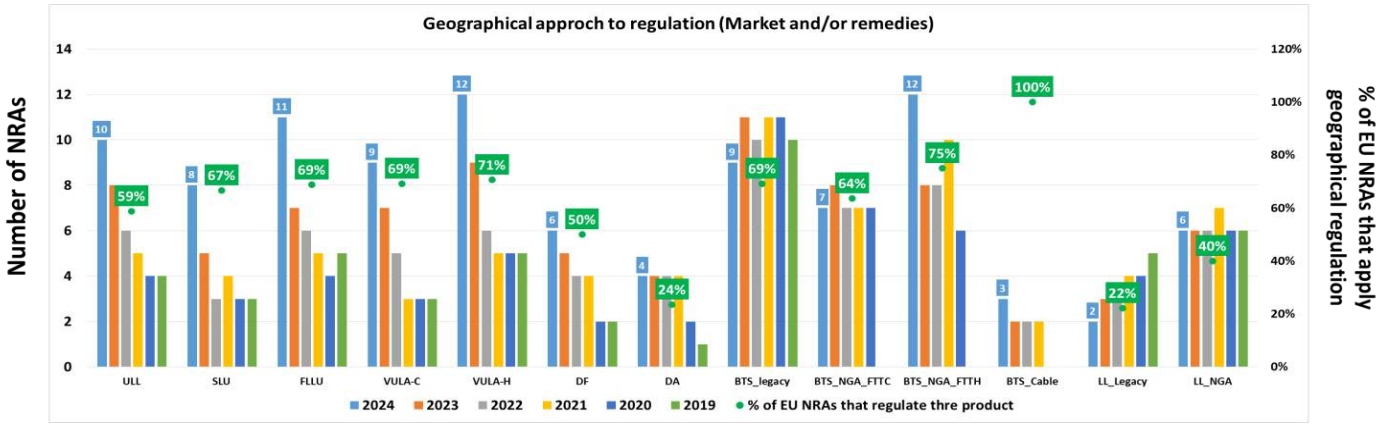
Geographical regulation

A differentiated geographical approach to regulation generally 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 8 the number of NRAs, and the percentage of EU NRAs, that have applied some form of geographically differentiated approach is provided for each market and product for 2024 and previous years.[51] In the same figure the percentage of EU NRAs that apply a geographical approach to regulation is also given with respect to all EU-NRAs that regulate the product market.

The number of NRAs that have identified different competitive conditions across the national territory justifying a geographically differentiated approach (in terms of market definition and/or remedies application) has increased consistently in comparison to last year for most markets/products.[52] More than 50% of NRAs that regulate market 1 apply a geographical approach to regulation (last year this was less than 50%). The increasing trend prevails notwithstanding the deregulation cases of the corresponding product.

Figure 8– SMP - geographically differentiated regulatory approach[53]



Source: BEREC RA Database 2024

In Figure 9 the percentage of EU NRAs (27 NRAs) that apply a geographical approach to regulation is given for 2024 for those NRAs that regulate the market in question; in the illustration the percentage is provided for: i) market; ii) market and remedies; iii) remedies. “Market” means that NRAs

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.

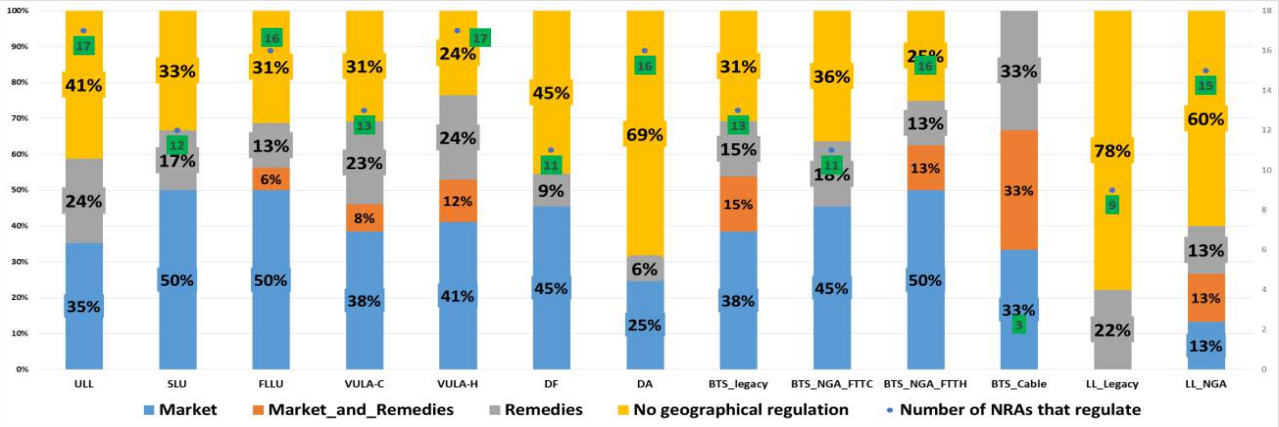
[51] In the context of symmetrical regulation only FR apply a geographical differentiation of the symmetrical access remedy: the access to the terminating segment (inside buildings) is available only in less than 20% of households (more competitive areas) and in the rest only symmetrical access beyond the first concentration point is available.

[52] The replies of the previous years are homogenous with the current report.

[53] When 100% is given this means that all NRAs that regulate the specific product also apply a geographical regulatory approach.

apply a differentiated approach in different geographical markets: in that case there is generally a geographical area where regulation is lifted 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 9 – SMP - geographically differentiated regulatory approach



Source: BEREC RA Database 2024

NRAs that apply a differentiated approach to regulation are reported in Figure 10. In the table the percentage of households 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.[54]

The same picture shows that deregulated areas range from 5% of households up to 95% for local access products and central access products, more often between 20% and 50%, increasing in comparison to last year’s report.[55] In green the updated values are given: a geographical regulation approach is becoming very common with an increase of the levels of deregulated areas as well as an increase of the incidence of the more competitive areas. The percentage of households falling under a geographical regulation in combination with less regulatory obligations is increasing in a number of countries, (HR, IT, IE, CY, LV, ES, PL, PT) in line with a regulatory path where a geographical regulation is applied to avoid non-proportional regulation (the order of countries in Figure 10 follows the one reported in Figure 7).

[54] A missing value in the table means that there is no regulated product. 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.
[55] PT apply a differentiated market and remedies approach in market 2; 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. In PT some regulatory obligation on ULL and Bitstream FTTH is present in a small part of the country. FI: Former Market 3a has 150 relevant geographic wholesale markets. Remedies have been differentiated by SMP operator (3 large operators have stronger remedies than 18 small operators), not geographically.

Figure 10 – Households in deregulated/competitive areas

	FLLU		VULA FTTH		BTS FTTH		VULA FTTC		BTS FTTC		ULL		BTS legacy		LL NGA		Duct access		FTTH
	Deregulated areas (Market regualtion)	Competitive areas (remedies differenciation)	Deregulated areas (Market regualtion)	Competitive areas (remedies differenciation)	Deregulated areas (Market regualtion)	Competitive areas (remedies differenciation)	Deregulated areas (Market regualtion)	Competitive areas (remedies differenciation)	Deregulated areas (Market regualtion)	Competitive areas (remedies differenciation)	Deregulated areas (Market regualtion)	Competitive areas (remedies differenciation)	Deregulated areas (Market regualtion)	Competitive areas (remedies differenciation)	Deregulated areas (Market regualtion)	Competitive areas (remedies differenciation)	Deregulated areas (Market regualtion)	Competitive areas (remedies differenciation)	State Aid plan
(BE-)	0	<5%	0	<5%	0	<5%	0	<5%	0	<5%	0	<5%	0	<5%	0	<5%	0	0	<5%
(HU-4)	<20%	0	<20%	0	<20%	0	<20%	0	<20%	0	<20%	0	<20%	0	0	0	<20%	0	<5%
(SI-)	0	<5%	0	<5%	<50%	0	0	<5%	<50%	0	0	<5%	<50%	0	0	0	0	<5%	
(HR-3)	<40%	0	<40%	0	<40%	0	<40%	0	<40%	0	0	0	0	0	0	0	0	0	<10%
(FI->5)	<5%	0	<5%	0	<5%	0	<5%	0	<5%	0	<5%	0	<5%	0					
(IT->5)	<5%	0	<5%	<10%			<5%	<10%			<5%	0			<5%	<20%	<5%	0	<50%
(CZ-3)	<95%	0	<95%	0			<95%	0			<95%	0							<5%
(DE-)			0	0	0	<5%	0	0	0	<5%	0	0	0	<5%	0	0	0	0	<5%
(EL-)			0	0 (criteria defined)	0	0 (criteria defined)	0	0	0	0 (criteria defined)	0	0	0	0 (criteria defined)	0	0	0	0	0
(IE-4)			<20%	0			<20%	0							0	0	0	0	<20%
(CY-)			0	<10%			0	<10%			0	0			0	0			<20%
(LV-2)	<30%	0	<30%	0	<30%	0											0	0	0
(ES-3)			0	<70%	<70%						<70%	0	<70%	0	0	0			0
(PL-)	<50%	0			<50%	0			<50%	0	<50%	0	<50%	0			<50%	0	0
(LT-)	0	0			0 (criteria defined)	0					0	0	0 (criteria defined)	0	0	0	0	0	0
(PT-2)	<95%	0			<95%	0									<20%	0	0	0	<10%
(DK-)	<95%	0			<20%	0													<5%
(FR-3)	0	<20%									0	<40%	<20%	<70%	0	<30%	0	0	<50%
(AT-1)															<80%	0			<20%

Source: BEREC RA Database 2024

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 figure in line with last year's report.

Figure 11 – More than two geographical areas (market or remedies)

Country	Numbers of markets/Remedy areas	Market/product	Notes
DK	>4_markets	Market 1 and market 3b	The low capacity copper network is a single national market with a single SMP, in such a case binding commitment have been accepted by the NRA without imposing any remedy; for high capacity market (NGA/VHCN) instead >4 SMP operators have been identified in different geographical areas. Four operators active in retail and wholesale markets are regulated in different geographical market through commitment only and are subject only on transparency and non discrimination in the geographical regulated areas; Four operators are wholesale only and are regulated in corresponding geographical areas with only non-discrimination obligation; Two vertical operators are regulated over market 3b (FTTC) and Fiber LLU applying, non-discrimination, transparency, obligation to publish a reference offer as well as price control (based on the commitment proposed by other operators);
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. SMP operators operate also in same geographical area, but on own different infrastructure
HU	>4_markets	For all markets/product with geographical differentiation	Only geographical market regulation: 3 regulated+3 deregulated markets. No differentiated remedies applied on regulated markets.
FR	3_remedy_areas	ULL/SLU/LL (market 2)	1)Cost orientation (by default) 2) Non-excessive pricing: at least 95% of premises connected for more than 9 months 3) Tariff remedy lifted and pricing replicability testing obligation in case of tariff higher than non-excessive area: commercial closure in place for more than 6 months and technical shutdown announced in less than 2 years

Source: BEREC RA Database 2024

In line with last year's report more information is provided on the implementation of the regulatory framework, on the topic of the geographical market/remedies application, on the criteria used by NRAs to define geographical market and/or remedies and on the frequency of update. The information provided by NRAs is shown in the table below per single country. Criteria for defining different geographical markets are generally the same as for local and central access products when regulated, they can be different from the criteria adopted for the leased line market (market 2). The market definition has been updated between market reviews, in case of remedies the frequency of update can be shorter than the market review process and more frequent "yearly". In case of the geographical market definition, the criteria adopted include coverage of alternative networks in combination with retail market share or structural parameters that address the issue of the sustainability of the infrastructure competition (FR). In case of remedies differentiation a more straightforward approach based only on the number of alternative networks in combination with coverage is often adopted, independently of the level of the retail and wholesale market shares measured.

The criteria for geographical market definition or remedies differentiation take into account the fact that more than two alternative networks are present in the relevant geographical areas. It doesn't mean that the alternative networks should fully overlap. In case the level of coverage of alternative network is ubiquitous or the alternative network is managed by a wholesale only operator, no condition on a third network is generally included to define the geographical market or remedies differentiation with the scope to find potential homogeneous deregulated areas or areas where obligations can be relaxed.

Table 3 – Geographical approach to regulation

	Geographical market definition		Time of update	Remedies differentiation			Time of update
	Merket 1 and 3b	Market 2		Market 1	Market 3b	Market 2	
AT	-	Combination of: i) Number of alternative network; ii) coverage threshold; iii) retail market share threshold	Only between market review				
BE	-	-		The CRC has differentiated the remedies geographically according to the circumstances: - in areas where at least three independent NGA operators (i.e. offering speeds of 30 Mbps and above) are present regulation will partly be lifted; If 3rd NGA is present with its own infrastructure or based on commercial passive access, some M3a remedies may be modulated. - regulation will also partly be lifted in the areas that are currently less well covered by high-speed infrastructures (those areas represent approximately 5% of households in Belgium). Operators	If 3 NGA are present, M3b is deregulated	Differentiation at CO level depending on the volume and spread of connected endpoints. Price control lifted in the most competitive areas.	Yearly for market 2 and Other for other market/product

				are thereby stimulated to invest in these areas			
CY				Number of competitive VHCN networks			Other
CZ	v. combination combination of criteria retail market shares and coverage threshold	-	Only between market review				
DK	Coverage, presence of infrastructure, variation in retail products caused by alternative operators, only one threshold (5%) for significant presence.	-	Only between market review				
EL				Combination:Alternative network and coverage (The existence of alternative FTTH infrastructure with 80% coverage of the active broadband subscribers of the LE)	Combination: Number or alternative networks and coverage (The existence of at least two network infrastructures to cover all the area of LE)		three years for market 1 and yearly for market 3b
ES	Municipalities where there are at least 3 NGA networks with individual coverage greater than 20% and incumbent's share in the retail BB market does not exceed the 50% threshold.	-	Only between market review	Municipalities there are at least 3 NGA networks with individual coverage greater than 20% and incumbent's share in the retail BB market does not exceed the 50% threshold.	Municipalities there are at least 3 NGA networks with individual coverage greater than 20% and incumbent's share in the retail BB market does not exceed the 50% threshold.		Only between market review
FR		-		Geographical market differentiation depends on the density ("very dense areas" and "outside of very dense areas") List of communes considered to be in very dense areas was drawn up by Arcep on December 10, 2013.	In the market "outside of very dense areas", there are 2 zones for remedies. The "less competitive area" (not an Arcep name) is where there is no equivalent offer from a competitor of the SMP	ZC1: competitive area (at least one alternative wholesale provider at the MDF)/ ZC3: limited competition (no alternative wholesale provider at the MDF)	yearly
HR[56]	Number of alternative network; retail market share threshold For HAKOM the following conditions should be met: 1) At least one alternative operator has VHCN infrastructure (minimum. 2) The VHCN infrastructure of the alternative operator covers a minimum of 33 percent of user units in the geographical area. 3) HT Group's retail		two years				

[56] HR has defined a low capacity market that is defined as national in scope. Based on thorough geographical market analysis and chosen criteria for assessing the level of competition, HAKOM concluded that separate geographical markets should be defined for high capacity market. Two submarkets were defined: one competitive and the other not competitive. The geographic units chosen for detailed geographical analysis were cities and municipalities, with exception of the City of Zagreb which was additionally divided in city districts. In total 572 geographic units were subject to detailed geographical analysis.

	market share in that geographical area is less than 50 percent.						
HU	At least two significant alternative operators, with at least 15% market share each and 50% combined. Coverage threshold: 60% for each alternative network.	-	Only between market review				
IE	No. of competing operators, coverage and Market Shares		Only between market review				
IT	Retail Market share<30%; wholesale market share including self production <50%; alternative wholesale only network>80%; FTTH take up >40%	Market share including self production <30%; alternative FTTH wholesale only network>60% applied only in municipality where a materiality threshold of >50 leased lines are sold	Other		Retail Market share<38%; wholesale market share including self production <70%; alternative wholesale only network>70%; FTTH take up >30%	Alternative FTTH wholesale only network>70% applied only in municipality where a materiality threshold of >50 leased lines are sold	yearly
LT	Criteria to delineate geographic markets: 1) At least for two of the three relevant retail markets (internet, pay TV, fixed telephone) in a given municipality: -At least three (including Telia) retail operators, and; - One alternative operator shall have a retail market share of at least 25 % and; - Telia's retail market share does not exceed 40 %, or if the market share exceeds 40 %, another alternative operator's market share is less than Telia's market share by no more than 15 percentage points or greater than Telia's market share; and 2) Each of at least two alternative operators in that municipality shall have developed its landline network of at least 50 % of the residencies of that municipality, and 3) The coverage of the three operators in that municipality shall result in the duplication of at least 70 % of the residences in that given municipality Taking into account the Lithuanian particularity that alternative operators build their networks using ducts (access to ducts together with other market 3a products is regulated in market 3a), there is also an additional need in market 3a to evaluate which part of the networks of alternative operators is built using access to ducts (4th criterion)	-	Other				

	4) No more than 40 % of the retail users are accessible via another operator's access to physical infrastructure.						
LV	Demographic situation; Retail market shares; wholesale market shares; Number of alternative network;		Other				
PL	Orange Polska S.A. market share in retail fixed broadband is less than 40% there are 3 active operators At least 65% of households have access to at least three operators (this includes cable networks, even though cable is excluded from the relevant wholesale market) fewer than 10% households with no internet access		Only between market review				
PT	Civil Parishes where at least one of the following criteria is met: i) Presence of 3 networks with at least 15% coverage; ii) Presence of 2 operators with at least 90% coverage; iii) Civil Parishes located in Predominantly Urban Areas and iv) Civil Parishes where the leader's shares are between 40.0% (inclusive) and 50% (exclusive), and the leader's shares are falling (since 2019), or parishes where the leader has a share of less than 40%	Civil parishes that meet the following criteria: i) The existence of at least two alternative operator networks; ii) Two alternative operators with accesses installed/provided; iii) SMP operator's market share is less than 50 percent.	other				

Source: BEREC RA Database 2024

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 in parallel with the European Electronic Communications Code (EECC) due to the fact that in some cases the legal basis of the market review and

remedies framework is still based on previous directives. In any case, the remedy sets “Transparency”; “Non-discrimination”; “Accounting separation”; “Access”; “Cost accounting” and ”Price control” are still available in the EECC.[57]

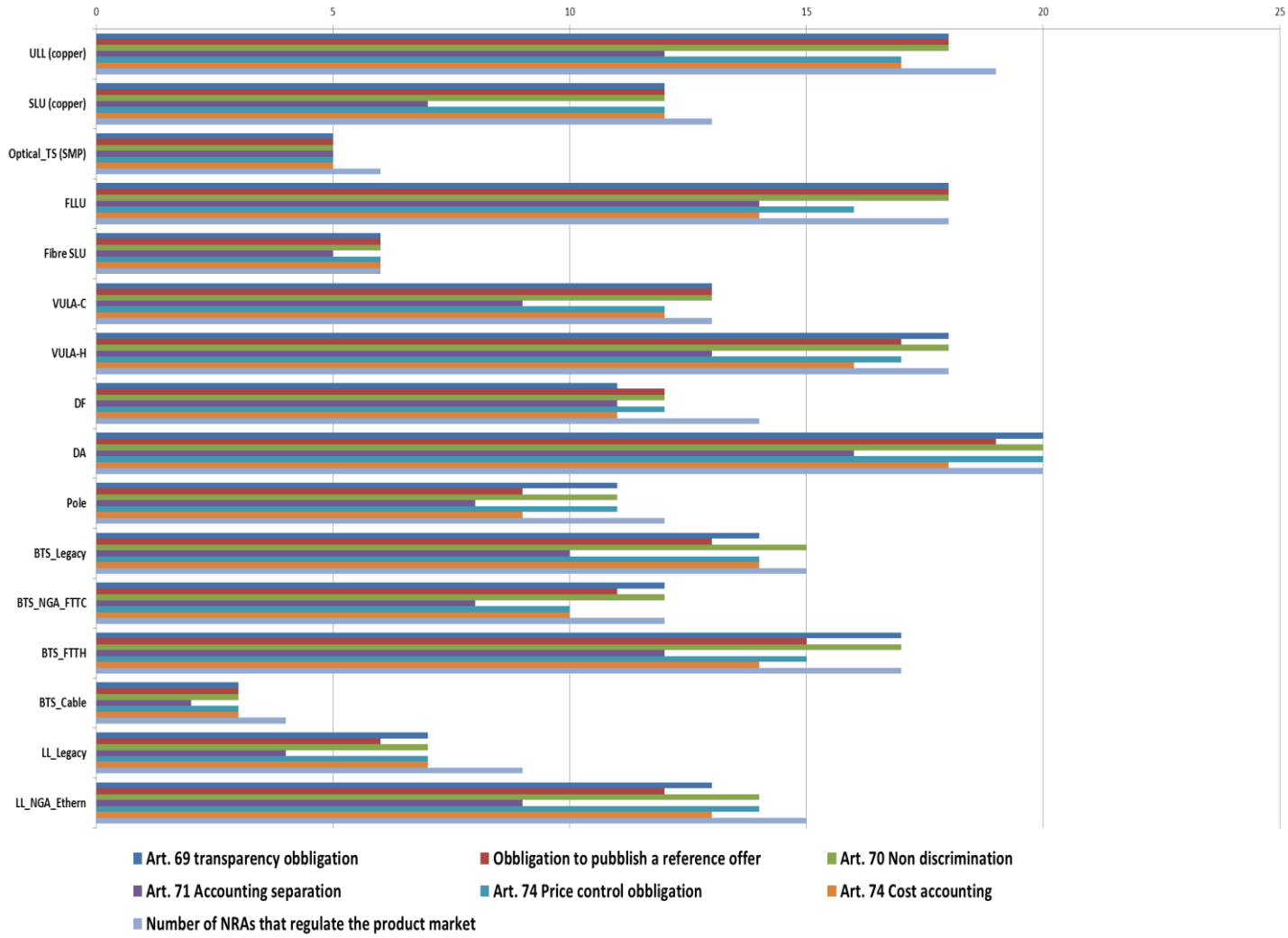
Figure 12 – EECC art. 69-74

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 considering that when the product is regulated at least the access obligation is imposed.

[57] In relation to the EECC we refer to: Art. 69 (Obligation of transparency), Art. 70 (Obligation of non-discrimination); Art. 71 (Accounting separation); Art. 74 (Price control and cost accounting obligations).

Figure 13 – Application obligations Art. 69-70-71 and 74 EECC[58]



Source: BEREC RA Database 2024

Figure 13 shows that different sets of remedies have been applied to each product.

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

Focusing on Regulatory accounting, accounting separation is the less commonly used remedy and 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. Since last year a substantial modification of the distribution of the regulatory

[58] Labels indicate relevant markets according to the 2014 Rec when needed. For LT cable operators are regulated only in the way of access granting: if an alternative operator has its own wholesale access products, it must provide access to other operators (SMP included) if required. Cable operators are regulated only on the basis of a legal act (Access granting rules).

remedies applies where the copper network is becoming quickly less relevant in comparison to FTTH regulation and Ducts Access.

In line with the past year, considering the "competitive areas" where geographical remedies differentiation is applied to some products (BE, SI, IT, EL, CY, DK, FR), the set of remedies that are applied in more competitive areas can be divided into three groups of NRAs: i) the price control obligation has been eliminated, holding all other SMP remedies (SI, IT, FR[59], EL); ii) only access and transparency obligations/publication of a reference offer have been maintained (BE); iii) all set of remedies in the same geographical market have been completely eliminated (CY, ES, DK).

The following figure 14 reports information acquired in the survey that is relevant to determine the rationale for the remedies imposed in light of the geographical market remedies declination.

In the following figure information is reported always in the same order and group of countries already considered in previous sections. Separately, for the four groups of countries, and for each technology (copper, FTTC, FTTH), the average number of remedies applied by NRAs (transparency; obligation to publish a reference offer; non-discrimination; accounting separation; price control; cost accounting) to different access technologies are reported;[60] for the same four groups of countries and technologies the extent of competitive areas and deregulated areas in terms of average households measure is also given[61] taking into account information on deregulated areas/more competitive areas previously reported.

From the averages evaluated in the four groups we can see the following outcome.

- ✓ In countries where FTTH still lags behind in terms of coverage and take-up and the technology mix is still in favour on copper (second group), the regulatory pressure appear to be lower on VHCN in the spirit to incentivise investment. Regulation mainly addresses the copper/NGA network with a reduced average number of remedies applied on FTTH. In combination the amount of areas that are deregulated/ more competitive is lower with respect to all other group of countries.
- ✓ In countries where the technology mix is more balanced (first group), the obligations over VHCN are widely imposed comparable with NGA network. In such group there is a wider deregulated/competitive area (increasing with respect to last year report) with respect to the previous group considered.
- ✓ In countries where the VHCN coverage and take up is at an advantage stage (third group) the regulatory pressure is lower and regulation is focalized on VHCN as expected with a wider level of deregulated/competitive areas on average with respect to what is measured in previous group of countries.

In combination with the outlined information in this year's survey three main questions have been included.

The survey included the following questions for each of the three main geographical areas (deregulated, more competitive areas in case of remedies differentiation and less competitive areas where remedies are applied): "*i) Which is the main driver of competition in the deregulated areas; ii) Which is the main driver of competition in more competitive areas?; iii) "Which is the main driver of competition in less competitive areas?"*

[59] On market 3b the obligation to publish a reference offer is also removed on the "competitive areas"

[60] The average for copper considers the sum of the remedies applied for ULL + market 3b legacy remedies; for FTTC considers the sum VULA FTTC+FTTC market 3b remedies; for FTTH, the sum VULA FTTH+FLLU+FTTH market 3b and over cable, remedies.

[61] The average has been evaluated considering "0" where regulation is in charge without combining any geographical approach to regulation in market 1 and/or 3b. In case of geographical differentiation the maximum % of households has been considered for products in access market (local and central) as reported in figure 8; "100%" of flexibility where no regulation is present on the corresponding technology is considered. Only EU countries have been considered when calculating averages.

For the three questions the following options were given, that can be used in combination and specific order of relevance: *"by SMP regulation; by SMP commercial agreements; by co-investment; by infrastructure competition through access SMP civil infrastructures; by infrastructure competition through cable platform/own FTTH network; by third party wholesale only operators; Other.*

Replies are reported in figure 14.

First of all, infrastructure competition is the main driver in deregulated areas or more competitive areas as it is mentioned as the first option for almost all countries.

More relevant is the fact that SMP civil infrastructure access is much more frequent in the third group of countries where VHCN is already at an advanced stage: it is mentioned as first or second option more times over the three potential areas (deregulated, more competitive, and regulated) 6 times over 30 possibilities (3*10 countries) where a score of 20% can be given.

If we consider all the countries in the first two groups: i) countries where the technology mix is still balanced; ii) countries where copper network is still relevant for NGA, we observe the following situation. In the first group SMP civil infrastructure access is mentioned only 2 times over 27 possibility (3*9 countries) with a score of 7% and for the second group the score is 0%.

In countries where the transition to VHCN is already at an advanced stage the competition condition can be more frequently driven by access to civil infrastructures when SMP regulation is in charge, eventually in combination with access to symmetrical access services, or regulated VULA remedies., This is relevant only in few countries. In such countries a model based on SMP FLLU does not appear to be directly effective to foster competition even if imposed as a remedy (10 NRAs over 12) in most countries.[62]

[62] Only in LI a model based FLLU provided by the SMP operator is effectively relevant for competition.

Figure 14 – Combination remedies-geographical scope of regulation[63]

	Avarage number of remedies applied			Avarage level of deregulation+ competitive area (% of households)					
	copper	FTTC	FTTH	copper	FTTC	FTTH	Main driver of competion (Deregulated areas)	Main driver of competion (More competitive areas)	Main driver of competion (in regulated areas)
(BE-)	[70-75]% ([80-85]%)	[65-70%] ([65-70%])	[65-70]% ([75-80%])	[25-30%] ([30-35%])	[30-35%] ([30-35%])	[30-35%] ([30-35%])		infrastructure competition through cable platform/own FTTH network	SMP regulation
(HU-4)							infrastructure competition through cable platform/own FTTH network		infrastructure competition through cable platform/own FTTH network
(EE-3)								by infrastructure competition through access SMP civil infrastructures (no remedies differentiation yet)	
(SI-)									
(SK-)									
(HR-3)							by infrastructure competition through access SMP civil infrastructures; by infrastructure competition through own FTTH network		
(FI->5)									
(IT->5)							By third party wholesale only operator	By third party wholesale only operator	by SMP regulation
(CZ-3)							by infrastructure competition through cable platform/own FTTH network; Other - competition from other infrastructures (including wireless technologies) or by SMP commercial agreements		by SMP regulation
(DE-)	[55-60%] ([80-85%])	70-75%] ([85-90%])	[30-35%] ([35-40%])	[0-5%] ([10-15%])	[15-20%] ([10-15%])	[15-20%] ([10-15%])	by SMP regulation; by infrastructure competition through cable platform/own FTTH network (market 3b)		
(EL-)									by SMP regulation
(IE-4)							Infrastructiure Competition	Infrastructure competition	
(CY-)							by infrastructure competition of VHCN networks as defined by BEREC guidelines		SMP regulation (VULA)
(LU-)	[40-50%] ([80-85%])	[20-25%] ([40-45%])	[40-45%] ([40-45%])	[50-55%] ([50-55%])	[40-45%] ([40-45%])	[50-55%] ([30-35%])			
(LV-2)							For fiber: Other (infrastructure competition through own FTTB and also FTTH networks), to small extent - by infrastructure competition through access SMP civil infrastructures		
(NO-5)									By infrastructure competition through cable platform/own FTTH network
(ES-3)							By infrastructure competition through access SMP civil infrastructure and infrastructure competition through own FTTH network	By infrastructure competition through access SMP civil infrastructure and infrastructure competition through own FTTH network	SMP regulation, by infrastructure competition through access SMP civil infrastructure and infrastructure competition through own FTTH network
(MT-)									
(PL-)							by infrastructure competition through cable platform/own FTTH network		
(LT-)									
(PT-2)							By infrastructure competition through access SMP civil infrastructures.		
(DK-)							By infrastructure competition	infrastructure competition through access SMP civil infrastructures; by infrastructure competition through cable platform/own FTTH network	By SMP regulation (FLLU, VULAH)
(FR-3)									
(LI-5)									by SMP regulation
(SE-)									
(RS-3)	[0.-5%] ([0-5%])	[0.-5%] ([0-5%])	[0.-5%] ([0-5%])	[95-100%] ([60-65%])	100%	100%			by SMP regulation
(BG-)									
(AT-1)							Infrastructure based competition from alternative FTTH networks (mainly from utilities)		SMP regulation (LL)
(NL-)									
(RO-)									

Countries where all remedies are applied on VHCN

Countries where not all remedies are applied on VHCN

Countries where small set of remedies are applied on FTTP

Mainly deregulated market/ no remedies on market 1

Source: BEREC RA Database 2024

According to the new regulatory tools in the Code, NRAs were asked to provide information on the following: i) experience with co-investment agreements or cooperative deployment of fixed VHCN networks and if and how the regulatory framework has been affected by this (i.e. art. 76-79 of the EECC); ii) if commercial wholesale agreements offered by SMP for VHCN/NGA with respect to the specific product/market are present and how do they affect the regulatory context (i.e. art. 68); iii) the imposition of functional separation (art. 77 of the EECC); iv) if voluntary separation of SMP has

[63] In the label country the values of the number of operators that has >3% of the market share is also reported as described in previous section. In parentheses also the information on previous year report calculation of the main indicators is given.

been presented and evaluated (art. 78 of the EECC); v) if are other wholesale only operators present in the market and if and how those operators have affected the regulatory framework (i.e. art. 80 of the EECC).

The replies from NRAs are limited showing that those new issues addressed in the EECC have still limited application. In the table below the replies to the survey are reported: 8 countries declared specific forms of cooperative deployment (AT, FR, PT, IT, BE, CZ, ES, RS) largely in line with last year's report. In one case the agreement can involve the SMP operator or only OAO (PT); three other countries have stated that the SMP operator has specific commercial offers (SE, PL, FI) same as in 2023. For FR the co-investment agreement is an obligation in non-competitive areas in charge to the infrastructure operator in a symmetric framework obligation of access. In CZ co-investments involve the VULA FTTH product, whereas for all other countries cooperative deployment or commercial agreements are related to passive access such as FLLU. In case of PT and ES, SMP access to civil infrastructures as a main instrument for competition, has incentivised the cooperative deployment of the networks and reciprocal access services. In all other cases cooperative deployments are still under consideration or not yet considered to have an impact on the corresponding regulatory framework as reported in the following country cases.

	Are co-investment /cooperative deployment or commercial agreements present in the market?	**Specific information**	**Impact on the regulatory framework**
AT	Commercial agreements in all relevant areas (es.excluding state aid areas)	Wholesale access agreement concerning access to newly built VHCN infrastructure (no co-investment)	The commercial agreements (concluded for five years) were considered sufficient to deregulate markets 3a-b.
BE	Cooperative deployments (JVs) but no co-investment in the sense of Art. 76 EECC	Telenet/Orange FTTH commercial agreement	Still not considered
CZ	Yes in all relevant areas (es.excluding state aid areas) (VULA) (coinvestment or cooperative deployment)		
ES	Yes in less densely areas (cooperative deployment and commercial agreement)		
FI		SMP operators provide wholesale access on commercial basis outside of their SMP areas. There are also new fiber network operators who provide access products on commercial basis	Under consideration
FR	In less densely areas (co-investment)	Orange is designated SMP in the M1 2020 current market analysis decision. Orange offers commercial wholesale agreements in the form of co-investments in some areas. Orange offers such agreements to "fiber commercial operators" (retail operators) to comply with its obligations as "infrastructure operator" (opérateur d'infrastructure) that are provided for in the symmetric regulatory framework.	SMP remedies designed and provided for in market analysis decisions taking into account competition circumstances of the market and remains coherent with the symmetric framework.

IT	In some principal cities	A joint venture between the SMP operator and one main vertically integrated alternative operator happens between 2018 and 2021. During this first tranche of investments, the scope of intervention involved 29 main cities (about 15%- 20% of national households). In summary the co-investment takes the form of access in unbundled form (passive unbundling) to the secondary fiber optic network from the cabinet currently used to supply the SLU services over copper network up to the end user customer's side.	Competition Authority authorized the Joint venture and next agreements after 2021. Agcom has imposed obligation to the SMP operator to provide access to passive fiber services (Semi-GPON and Full GPON) in line with the technical products already available in the commercial agreements, at fair and reasonable price and all other set of remedies including the publication of a reference offer.
PL	Yes in all relevant areas (es.excluding state aid areas) (commerical agremeent)		Still not considered
PT	Yes in all relevant areas (es.excluding state aid areas) (co-investment, cooperative deployment)	In Portugal, several bilateral sharing agreements have been signed: for example, fixed network sharing between Altice and Vodafone Portugal in 2014, as well as between NOS and Vodafone at the end of 2017, and it is estimated that by 2024 around 3.9 million Portuguese homes will be connected through sharing agreements between the three main electronic communications operators. There was also a commercial agreement between Altice and another operator in 2023. The co-investment agreement for the construction of a fiber optic network between Vodafone and NOS aimed to reach around 2.6 million homes. The agreement to develop and share a nationwide infrastructure thus enabled the two operators to make their commercial offers available under the shared network from 2018. With this partnership, NOS intended to exceed 4.4 million homes passed by the end of 2018 and make Gigabit Internet available to its customers. Vodafone, on the other hand, planned to reach 1.3 million more families and businesses, totalling around 4 million homes passed with NGA. In July 2019, the same operators announced the establishment of autonomous agreements with DSTelecom - a regional wholesale-only (State-aid) operator - for access to the new fiber optic network to be built by this wholesale supplier, covering 1.2 million homes. The main aim of this agreement was to build a new fiber-optic network in areas of the national territory that were not covered at the time and were not subject to coverage plans under the agreement between Vodafone and NOS.	Due to the commercial agreement signed by Altice (operator with SMP) with another operator in 2023, more civil parishes began to meet the coverage criteria that led to deregulation (FLLU and BTS_FTTH).
RS	Yes in all relevant areas (es. excluding state aid areas) (cooperative deployment)	-	-
SE	Yes, in all areas. (commercial agreements)	SMP offers VHCN/fibre wholesale products according to regulation, but also 3b-like access to its fibre network (communication operator access)	

Functional separation

No NRA has imposed the application of art. 77 of the EECC (functional separation) (former art. 13-bis 2002/19/CE), but two NRAs have assessed a voluntary separation of the SMP (IT and CZ) (art. 78 of the EECC former art. 13-ter 2002/19/CE).

In IT's last market review (2024) the incumbent operator proposed a legal separation project that could enhance the equivalence model in charge (functional separation): extension of full EOI implementation on civil infrastructure access and all other access services such as VULA-C services previously based on a partial EOI model. The regulatory outcome with respect to the implementation of this new enhanced Equivalence model was mainly on the relaxation on the replicability test in the public tender procedure, Agcom has considered that the competitive impact of the legal separation model proposed was not relevant on the competitive outcome, as the control of the legally separated entity remained in charge of the SMP operator. Since the 1st of July 2024 the SMP operator is structurally separated and this project will be analysed in a new market analysis taking into account the procedure of art. 80 point 2. The Remedies framework established in the current market analysis decision applies to the wholesale structurally separated entity that is in charge of the wholesale provision until the new market analysis will be finalised.

In case of CZ the SMP operator is a legally separated entity. Voluntary separation took place in 2015, before the introduction of the Code, and therefore Article 80 of the Code could not be taken into account. Furthermore, the SMP operator is a legally separated entity (however not fully meeting all the criteria in Art. 80 Directive 1972/2018) and provides on its network only wholesale services. Obligation of EOI is in charge apart from non-discrimination, not imposed because it was implemented by a vertically separated SMP. All wholesale partners (incl. the former retail arm) are using the same ordering systems and service provision.

In DK the former incumbent TDC is in a process of voluntary functional separation.

The general role of wholesale only operators (SMP or not) has thus been described by NRAs:

> (BE) A pilot project by a utility provider based on FTTH LLU, with a wholesale-only model is ongoing with a very limited footprint, the deployment has ended after an agreement with a cable SMP operator.
>
> (HR) A few smaller operators provide wholesale services in a limited area, therefore they don't impact wholesale competition. In Market 2 there are several competitors at wholesale level competing with the SMP which may be very relevant with respect to the competitive outcome. This issue will feature in future market reviews, especially for urban areas with more business customers where the regulatory framework will be affected.
>
> (IT) The presence of a national wholesale only operator is having a very relevant impact on the competitive outcome in the market, allowing in more densely areas a competition model based on infrastructure since 2018 in Italy. In such a context Agcom has chosen to apply a detailed geographical regulation in principle updating competitive areas on an annual basis.
>
> (PT) There are 2 regional wholesale-only (State-aid) operators with FTTH networks in areas where the SMP operator had a smaller FTTH footprint. The presence of the two regional wholesale-only operators influenced the analysis of Market 1 conducted by ANACOM in 2023. In this context, their presence enlarged the footprint of the retail operators, leading to an increase in the number of civil parishes meeting the coverage criteria that resulted in deregulation.

3. Outline of the Results for Regulatory Accounting

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 refer to the instruments which are provided by the NDCM Recommendation[64] as adapted from the new Gigabit Recommendation[65] such as: i) the availability of an economic replicability test (ERT); ii) the imposition of non-discrimination obligations including the technical replicability test; iii) the adoption of the pricing flexibility principle in combination with anchor pricing.

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, (where available and relevant information on more competitive areas is provided).

Price control

For the price control methodology the following categories and sub categories have been considered (Figure 15).

Figure 15 - 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/Price Flexibility		Retail minus	

Source: BEREC RA Database 2024

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

[64] Commission Recommendation 2013/466/EU “On consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment”.
[65] Commission Recommendation 2024/539/EU “On regulatory promotion of gigabit connectivity”.

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 also to the relevant provisions of the Commission NDCM Recommendation to promote competition and enhancing the broadband investment environment 2013/466/EU), the same concept of ERT is included in the new Gigabit Recommendation 2024/539/EU.[66] 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 16).

Figure 16 - 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 2024

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 efficiency level of the incumbent operator in providing the services[67].

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

[66] The Gigabit Recommendation entered into force on the 24th February of 2024. The legal basis of the information provided are based on NDCM Recommendation when relevant as only one NRA has explicitly founded obligation on pricing issue on the legal basis of the Gigabit Recommendation at the time of data collection for the present report.

[67] 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.

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 17).

Figure 17 - Cost base categories and sub categories

Cost base
HCA
CCA

Source: BEREC RA Database 2024

3.2 Price control methods

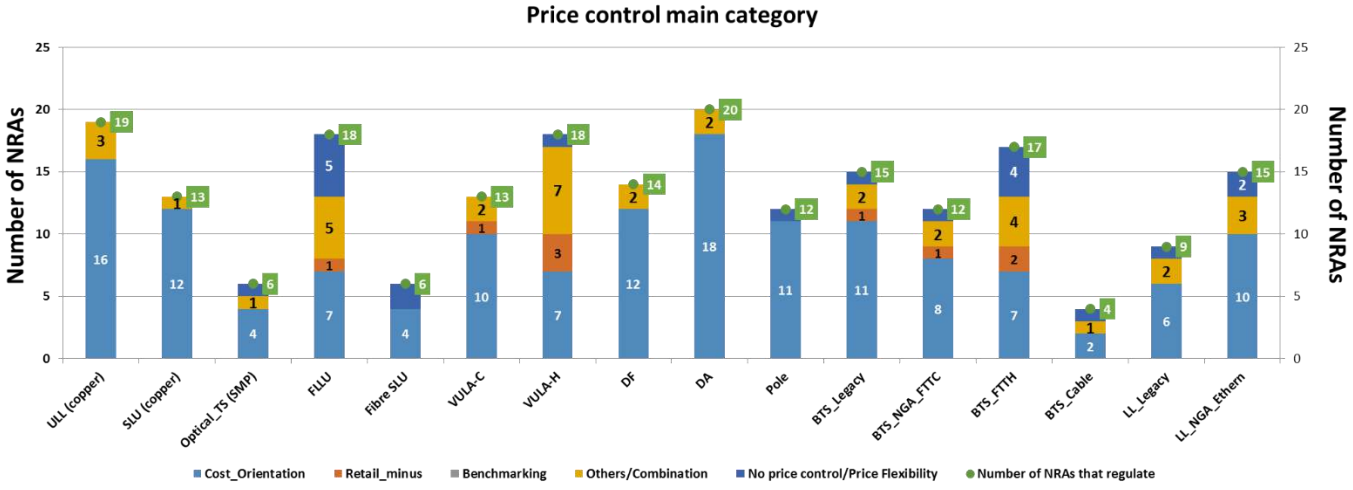
This section gives an overview of the price control methods used by NRAs in 2024 to regulate markets and products according to the main categories and sub categories, which have been previously reported.

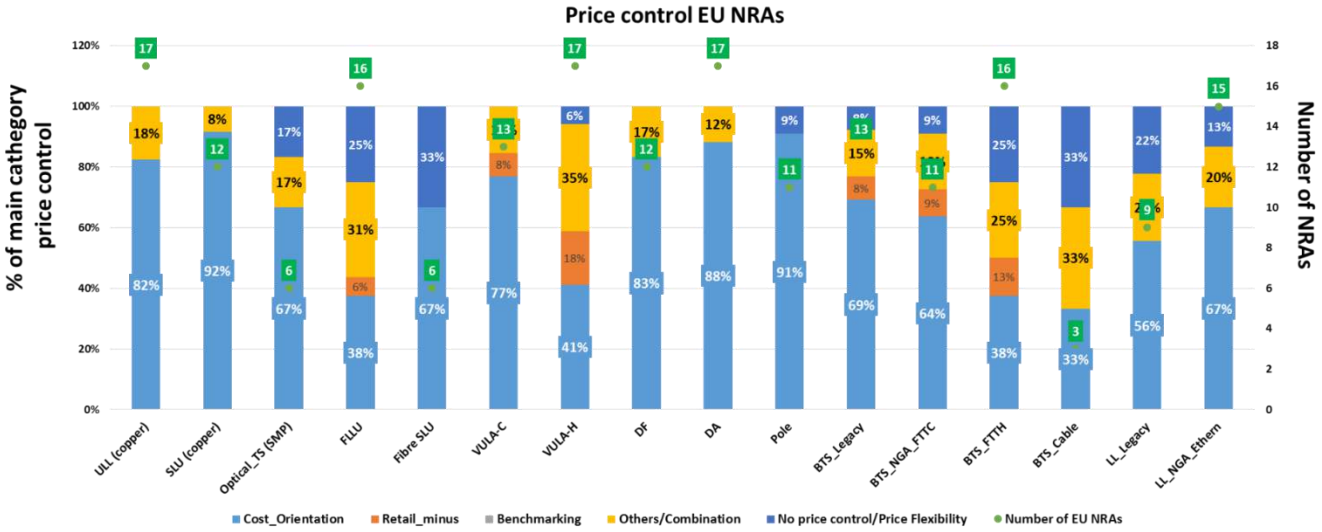
The absolute number of main categories chosen by all NRAs that replied to the questionnaire and that regulate the specific product market.

The percentage of the main category for the price control method in use taking into account only NRAs that regulate the market is given for EU countries alone (in the appendix more detailed information per country is given).

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 and duct access (Figure 18). Retail minus is sometimes applied to VULA FTTH products or in market 3b. Looking at EU NRAs about 20% (as last year) of NRAs that regulate VULA FTTH declared Retail minus whereas 41% of the 17 NRAs that regulate the corresponding product use cost orientation.

Figure 18 - Price control main categories

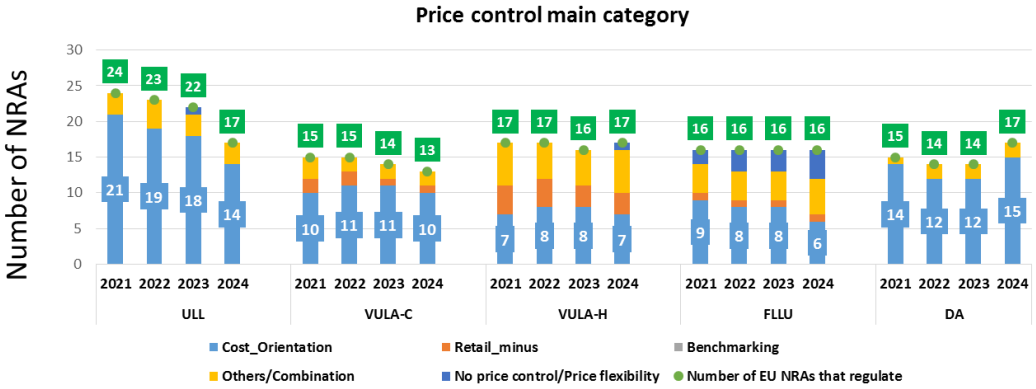




Source: BEREC RA Database 2024

In figure 19 the time series for EU NRAs have been considered over the last four years from 2021 from RA database.[68]

Figure 19 - Price control main categories time series



Source: BEREC RA Database 2024

The recorded changes in the last four years are summarised as follows: the change of pricing approach happens in very few cases in market 1 and changes are mainly due to the deregulation of some products (AT, DK, IE, LV, PT, 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. The situation is quite stable and even if the number of NRAs that regulate the market is generally decreasing, cost orientation (strict cost orientation or price cap) is still relevant for NRAs that maintain the regulation of the product/market.

[68] Only EU NRAs have been considered.

Figure 20 - Price control major changes 2021-2024 (market 1 main categories)[69]

Product	2024	2023	2022	2021
ULL	IE (removed regulation from CO) LV (removed regulation from CO); PT (removed regulation from CO); MT (removed regulation); SE (removed regulation from CO)	AT[70] (removed regulation from Other) MT (removed price control from cost orientation as not anymore relevant)	DK (removed regulation from cost orientation), SI (Started to regulate Other/ from cost orientation)	
VULA FTTC	LV (removed regulation from CO)	AT (removed regulation from Retail minus)	FI (introduced cost orientation from other combination)	LT (No more regulation)
VULA FTTH		AT (removed regulation from retail minus)	FI (introduced cost orientation from other combination)	LT (No more regulation)
FLLU	DE (removed regulation from CO) LV (from CO to Other combination)		DK (removed cost orientation with no price control),	MT (no more regulation from CO)
DA	PL (reintroduced the regulation of DA with CO); HR (reintroduced CO); BG (introduced CO)	HR (no more CO)	SI (Started to regulate Other/ from cost orientation) PL (removed regulation)	EL (started to be regulated CO)

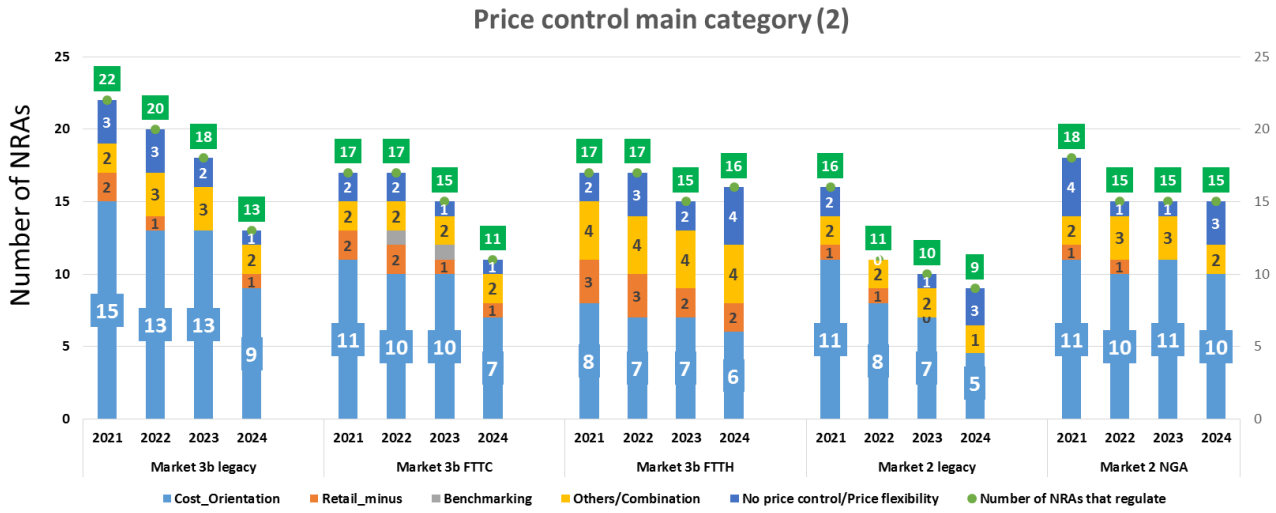
Source: BEREC RA Database 2024

Considering the products in market 3b and 2 in Figure 21 the following trend can be observed for the corresponding countries that have modified the declaration along the years. A reduction of regulatory obligations for market 3b over legacy network and a constant number of NRAs that implement an FTTH price control. Over the years reduction in the application of cost orientation and retail minus can be recorded. An evident decrease of price control obligation is seen in market 2 legacy network and for bitstream over legacy and FTTC technology.

[69] The historical series have been adjusted when a miss specification happens along the years that can happen also for material errors when needed. So, the last reported values are the best of our knowledge estimation. The year reported refer to the corresponding RA database updated (inclusion/exclusion) that can be different with the year of decision of NRA.

[70] AT decision had been taken in 2022 and RA report 2023 is the first RA report that report this new situation.

Figure 21 - Price control main categories time series (market 3b and 2)



Source: BEREC RA Database 2024

Looking at the four groups of NRAs previously described in figure 7 (NRAs have been ranked by the remedy set imposed: from a full range (of all products remedies) in market 1 to complete de-regulation). Cost orientation is more frequent where a legacy network based on copper is also relevant for NGA products (e.g. FTTC). This corresponds to a stronger interrelation between prices for old and new technology, since there is a stronger substitution effect with respect to the legacy copper product. As shown before, "cost orientation" is not decreasing for NGA products and might play a role in migration to VHCN.

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 a more flexible approach to FTTH regulation, also through the use of ERT, but more in general not to apply cost orientation.

In case the intermediate technology (FTTC) is present and plays a competitive constraint, the cost orientation on VHCN is an option to incentivise take-up and migration also on VHCN.

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 this assertion can be confirmed.[71] Figure 22 shows the average percentage of replies for each category of price control in each group of countries and technologies. Cost orientation (also for FTTH) is more frequent in countries in the first two groups, specifically where FTTC (or the full copper network) is still relevant for NGA deployment. This situation should also be considered in light of investment commitment to VHCN investments.

[71] The averages exclude non-EU countries.

This result is not in contrast with the one reported in figure 14 where the amount of obligations imposed on the respective technologies are calculated with respect to the maximum number of obligations applied to all markets/products.

As shown before price flexibility is also experienced by NRAs in the context of availability of effective retail price constraint provided by alternative infrastructures as infrastructure competition is considered the main driver of competition in deregulated areas and in more competitive areas: price flexibility is also more common in countries where full SMP obligations are still in force in non-competitive areas. In the third group of countries where VHCN is already at an advanced stage, cost orientation is also less common in less competitive areas.

Figure 22 – relation of price control main categories and general group of NRAs[72]

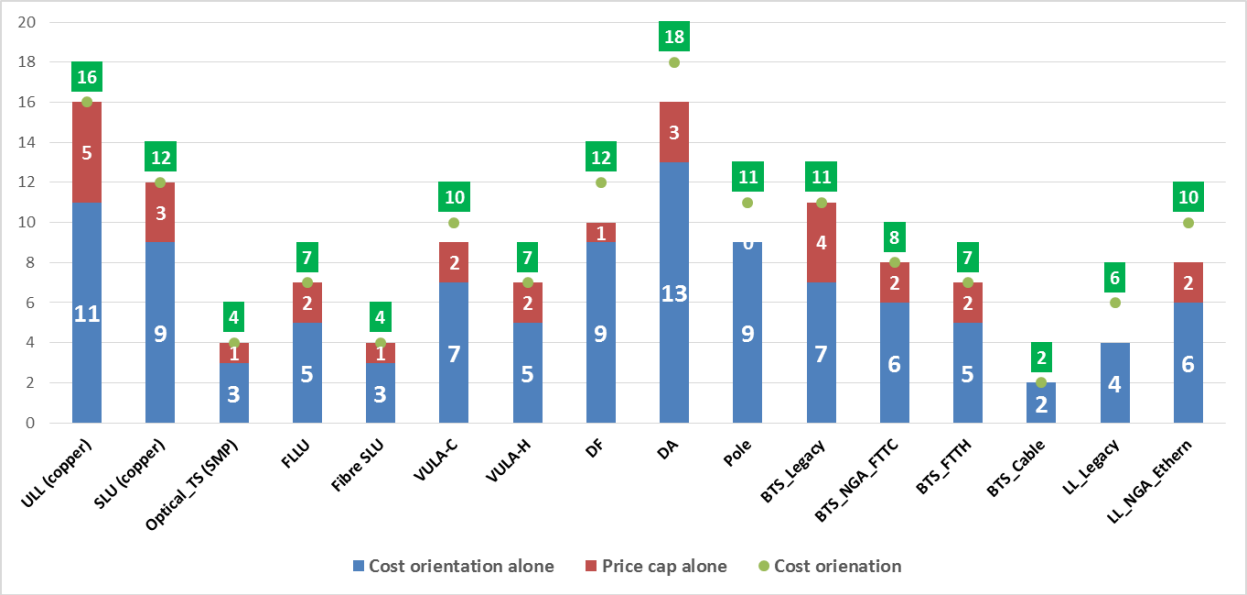
		ULL			VULA FTTC			VULA FTTH/FLLU			FLLU			
		Cost_Orientation	Retail_minus	Others/Combination	Cost_Orientation	Retail_minus	Others/Combination	Cost_Orientation	Retail_minus	Others/Combination	Cost_Orientation	Retail_minus	Others/Combination	
Countries where all remedies are applied on VHCN	(BE-) (HU-4) (EE-3) (SI-) (SK-) (HR-3) (FI->5) (IT->5) (CZ-3)	67% (67%)	0% (0%)	33% (33%)	67% (67%)	11% (11%)	22% (22%)	56% (44%)	11% (11%)	33% (22%)	56%	11%	33%	Competition condition still at an intermediate stage, NGA provided by a more technology mix (cable and FTTP, FTTC) copper network still present
Countries where not all remedies are applied on VHCN	(DE-) (EL-) (IE-4) (CY-)	75% (100%)	0%	0%	100% (100%)	0%	0%	50% (100%)	0% (0%)	25% (0%)	50%	0%	25%	Copper over FTTC is sill a relevant competitive constraint
Countries where small set of remedies are applied on FTTP	(LU-) (LV-2) (NO-5) (ES-3) (MT-) (PL-) (LT-) (PT-2) (DK-) (FR-3) (LI-5) (SE-)	50% (90%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)	20% (40%)	20% (25%)	20% (12%)	20%	20%	20%	FTTP is wider spread also with respect to cable
Mainly deregulated market/ no remedies on market 1	(RS-3) (BG-) (AT-1) (NL-) (RO-)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	Cable competition is more relevant in combination with higher level of FTTP coverage, competition condition are in a more advantage stage

Source: BEREC RA Database 2024

With respect to the sub-categories, Figure 23 highlights that cost orientation alone is still the most frequent price control method used by NRAs, especially in case of civil infrastructures access.

[72] In parenthesis the values of the last year have been reported in homogenous terms (when needed).

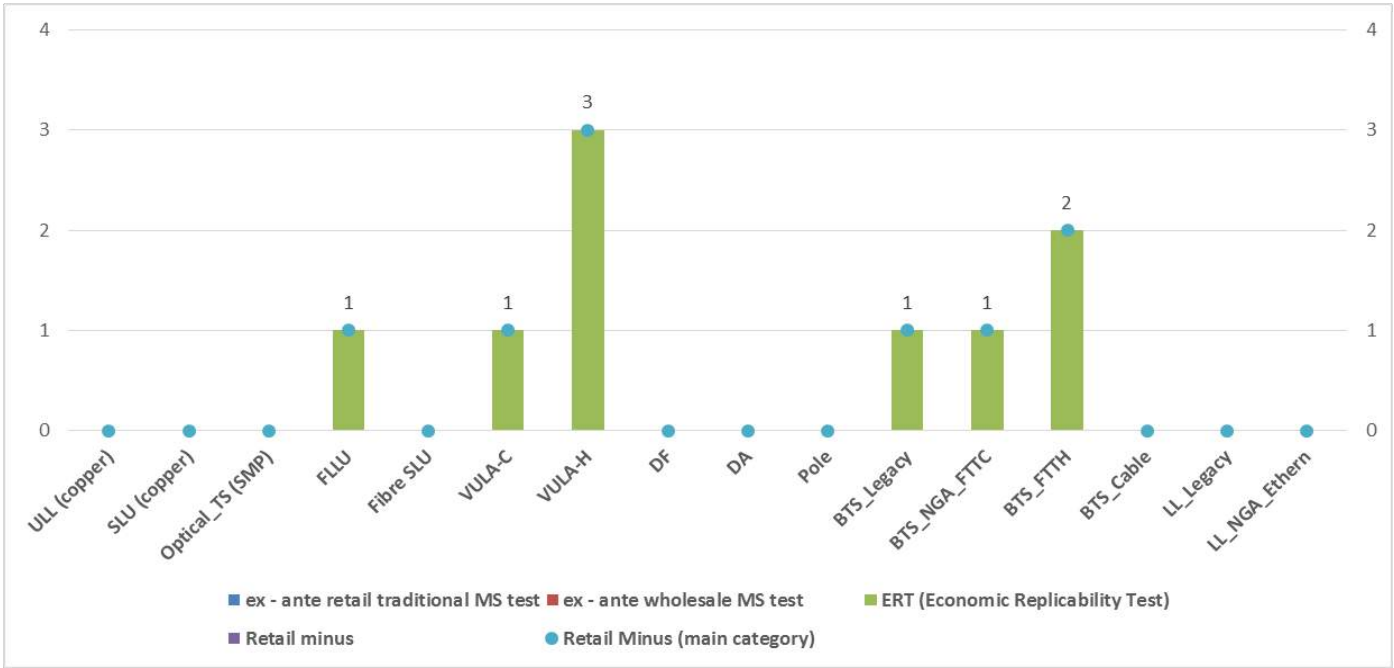
Figure 23 - Price control sub category Cost Orientation



Source: BEREC RA Database 2024

The ERT price control methodology has been mainly applied to NGA/VHCN products in line with the Commission Recommendation on Non-Discrimination and Costing Methodologies and the new Gigabit Recommendation, it is relevant as a general approach for price control obligation.

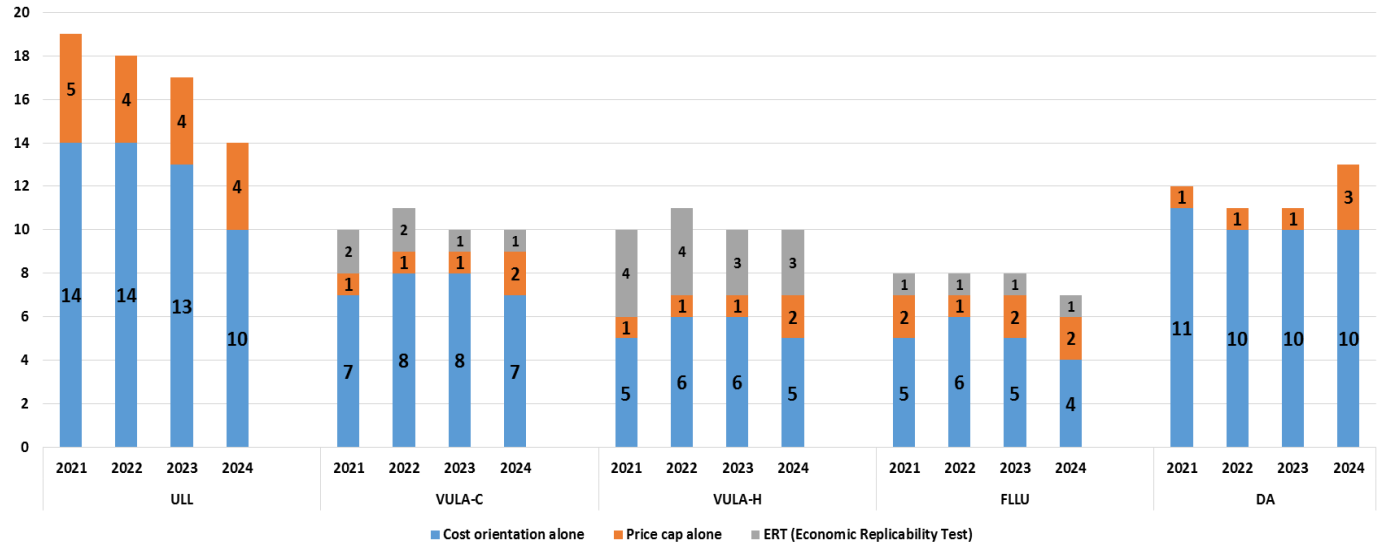
Figure 24 - Price control via ERT sub categories



Source: BEREC RA Database 2024

In figure 25 the evolution of the price control sub categories over time for EU countries declared for products in access markets within the last four years is given, providing information also on what NRA has changed sub category. It seems that the choice of price cap instead of cost orientation alone is more frequent when legacy network is less relevant for NGA services (i.e. FTTC).

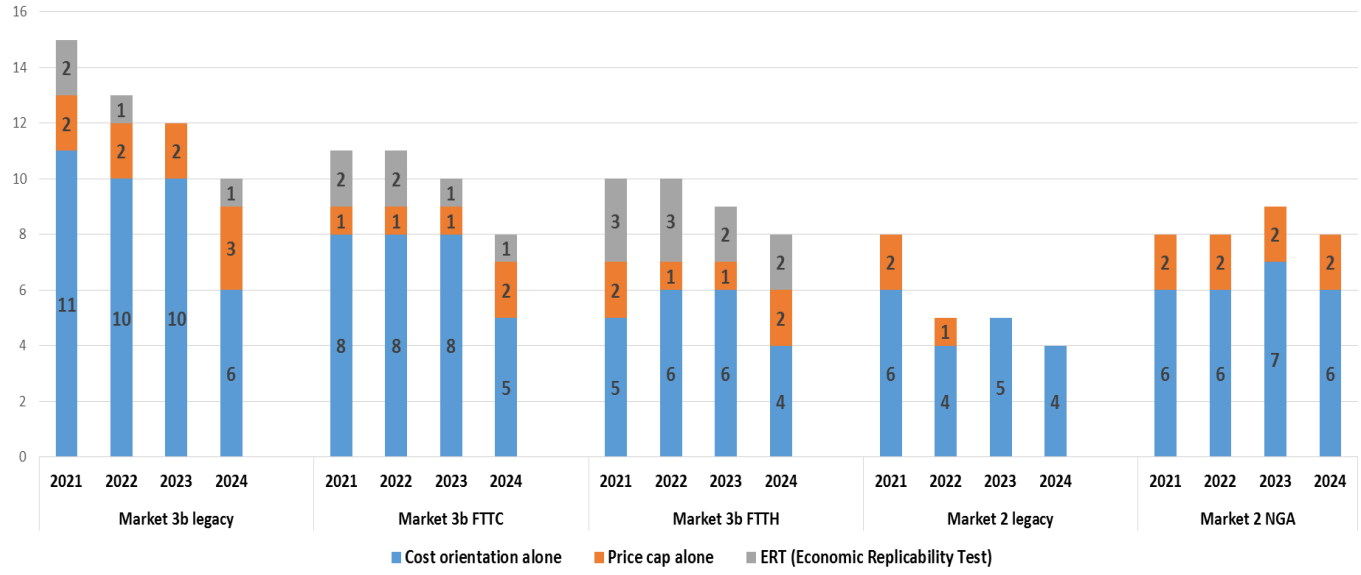
Figure 25 - Price control sub categories market 1



Source: BEREC RA Database 2024

Looking at central access products and leased lines (market 3b and 2) the following evolution can be found where the reduction is mainly related to the corresponding deregulation of the product market.

Figure 26 - Price control sub categories market 3b and 2



The following part provides more information on the concept of price flexibility of the NGA/VHCN wholesale product which is explicitly encouraged by the new Gigabit recommendation when some specific conditions are met.

One point that has been investigated more deeply is related to the issue of price flexibility, taking into account the provision of the recital 193 of the Code of Communication.[73]

The Gigabit Recommendation lists the conditions for not imposing cost orientation on the specific VHCN wholesale input. One of the options is the role of a regulated anchor service that satisfies points 41-45 of the Recommendation (i. e. the anchor is a cost oriented wholesale access product, which constrains the VHCN prices in such a way that retail services cannot be priced independently from this wholesale input. The anchor can be a combination of copper and VHCN based products or a portfolio of products[74]).

Thus, NRAs were asked to reply to these questions:

- 'in case “no cost orientation/price flexibility”, did the regulatory decision take into account the presence of a regulated anchor?
- if yes, which is the product considered as anchor (providing information on the technical characteristics)?
- Did the price flexibility allow the SMP to apply lower prices than the anchor legacy product?
- In case of price flexibility did SMP commitments resulting from the geographic survey to cover a significant part of the area within the market review period play a role (eventually supported by effective access agreements to the civil engineering infrastructures controlled by the SMP operator)?
- 'in case flexibility is not allowed by regulation, have NRAs defined a regulated anchor? If not, for what reasons?

Independently from the legal basis of the new Recommendation, several replies by NRAs help in focusing NRAs approach to flexibility in regulation.

A regulated anchor has been considered explicitly by NRAs where copper is still relevant for NGA services (IE and DE); ES declared a legacy equivalent ULL services as anchor in relation to specific geographical areas.

In IE the anchor product is the VULA over FTTC that is based on cost oriented price based on BU-LRIC+ methodology. The price flexibility principle consents to apply a lower price to VHCN products in comparison to the anchor legacy product. To operate this mechanism, the incumbent needs to provide evidence which will be subject to review for approval by ComReg. The FTTC based anchor always acts as the price floor so, if the incumbent is given permission to lower the VHCN price below the current FTTC anchor price, it will also have to lower the FTTC price.

[73] “*to prevent excessive prices in markets where there are undertakings designated as having significant market power, pricing flexibility should be accompanied by additional safeguards to protect competition and end-user interests, such as strict non-discrimination obligations, measures to ensure technical and economic replicability of downstream products, and a demonstrable retail price constraint resulting from infrastructure competition or a price anchor stemming from other regulated access products, or both. Those competitive safeguards do not prejudice the identification by national regulatory authorities of other circumstances under which it would be appropriate not to impose regulated access prices for certain wholesale inputs, such as where high price elasticity of end-user demand makes it unprofitable for the undertaking designated as having significant market power to charge prices appreciably above the competitive level or where lower population density reduces the incentives for the development of very high capacity networks and the national regulatory authority establishes that effective and non-discriminatory access is ensured through obligations imposed in accordance with this Directive”*

[74] Specifically, in case a copper based anchor would no longer exercise a demonstrable retail price constraint, and in the absence of a demonstrable price constraint due to the existence of alternative networks or regulated access to civil engineering infrastructures, the NRA should define an entry level regulated product provided over VHCN in the relevant wholesale market that can be virtual or active regulated product or both.

In DE the anchor product is a VULA copper based product that provides 100 Mbps speed. This product is an anchor both for VHCN and NGA network as it is the most used wholesale product and its price is cost orientated.

For ES the anchor price is also provided over the FTTP network via an active VULA product up to 30 Mbit/s; the cost oriented price for this anchor is constraint on ULL price equal to 8.61 Euro/month.

In case of DE and ES the decision has been supported by a relevant commitment on the investment plan for the VHCN deployment of SMP operator.

In relation to the question why price flexibility has not been allowed as a general principle even if an anchor pricing approach has been addressed, the case of IT has been reported. The competitive framework in the Italian market sees an emerging infrastructure competition, exercised by a wholesale only operator that has made specific investments in VHCN and acted as a first mover and not by the SMP operator, contrary to what happens in most European countries.[75]

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 EECC), or as a non-discrimination remedy (art. 10 of the AD, now art. 70 of the EECC). 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/art. 74 of the EECC 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.

The new framework of the Gigabit Recommendation considers the application of the ERT test as an option to overcome price control for VHCN wholesale products, in point 38 (c) it is mentioned

[75] In this context even if the FTTC product could be, in the current regulatory cycle, an anchor product, thus allowing in principle the conditions for establishing the flexibility over the VULA FTTH prices, flexibility has been considered potentially discouraging the adoption of VHCN and new investments. In particular, in areas where the alternative wholesale operator is investing -, and that for this reason are not yet considered as contestable Municipalities, where instead the flexibility is allowed – the price flexibility on VULA-H prices would likely lead to discount, possibly affecting renegotiations of actual contracts with alternative wholesale operator by access seekers. This would put the investments of the alternative wholesale-only operator at risk and would slow down the VHCN take-up. At the same time the SMP operator is allowed to present discount that should be approved by the NRA. On the other side, in the areas where only the SMP operator is present with its own VHC network, the flexibility could translate into an increase in wholesale prices, which in turn would discourage the take-up of services on the FTTH network, also in light of the lack of greater willingness to pay by consumers for higher quality services. Agcom has allowed in every case price flexibility on passive FLLU services. This is the outcome of the last market review ended in 2024, but the SMP operator structurally separated since the 1 of July 2024 and new market review is on-going where all the regulatory framework can be reviewed.

that one of the conditions for price flexibility is that: "*The NRA imposes obligations relating to the economic replicability test, applied in accordance with points 46 and 47 of this Recommendation*";

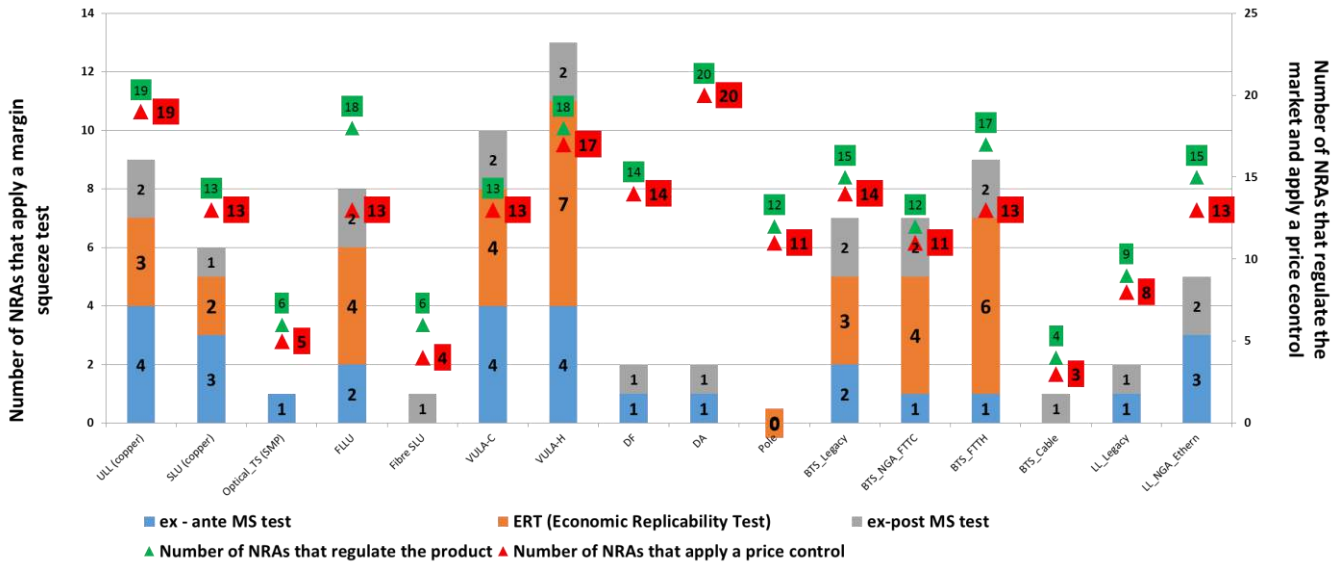
Summing up, margin squeeze tests have been used mainly as a complementary measure for a price control method, within the article ex-13 AD legal framework. The given options were (see BoR (14) 190): i) ex-ante margin squeeze test; ii) ERT (Economic Replicability Test); iii) ex-post retail margin squeeze 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). Almost all NRAs that declared to apply a margin squeeze test (ex ante or ex post), use the test in combination with a price control method applied, when cost orientation is present or in combination with price control or as instrument for price control as reported in previous sections (retail minus category).

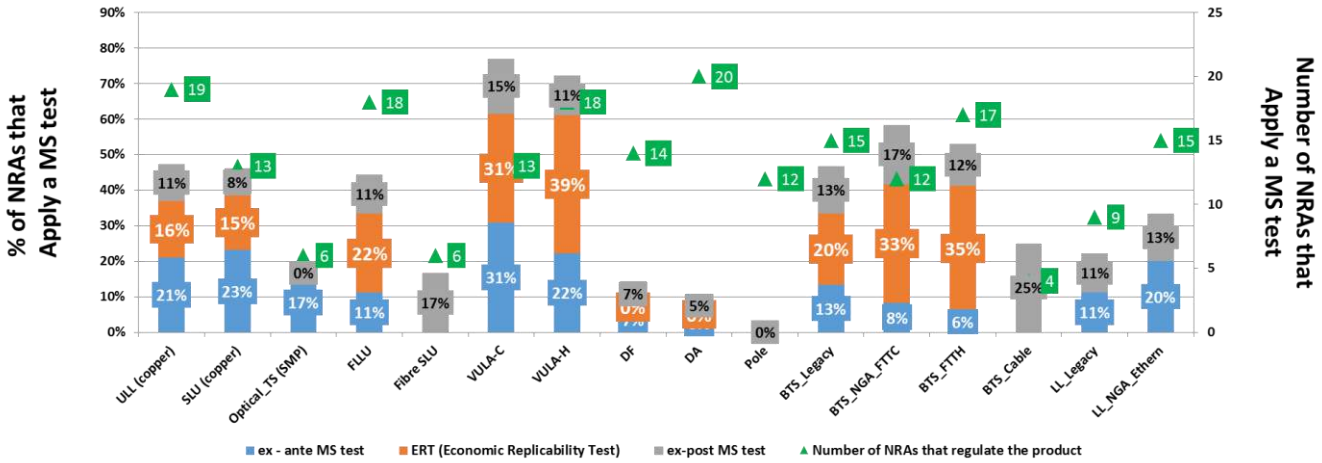
Only SE and ES, apply an ex ante test for one product without declaring a price control method: i) SE applies an ex ante ERT test for FLLU product in combination with EOI; ii) ES for Market 2 NGA product considers to apply a test on ex-post basis (initiative of the NRA or following a dispute issued by an operator), this test (the business replicability test, Business Fiber product) is focused on the tailor-made bundled offers that address business customers and take into account the various wholesale access services that an alternative efficient operator would require to provide such personalized offer.

In all other case where a price squeeze test is in force as a non-discrimination obligation this is in combination with a specific price control obligation. In the figure below the last updated survey on the application of a margin squeeze test is given (figure 27a).

Figure 27b shows that the presence of a margin squeeze test is more common for NGA/VHCN products: for regulated VULA FTTH 22% of NRAs apply an ex-ante test, when 39% of NRAs apply an ERT test, indicating that the application of the margin squeeze test becomes more relevant for NGA products in market 1, in line with past year's report.

Figure 27 a-b–Number of NRAs that apply margin squeeze tests and % of NRAs that apply a margin squeeze test

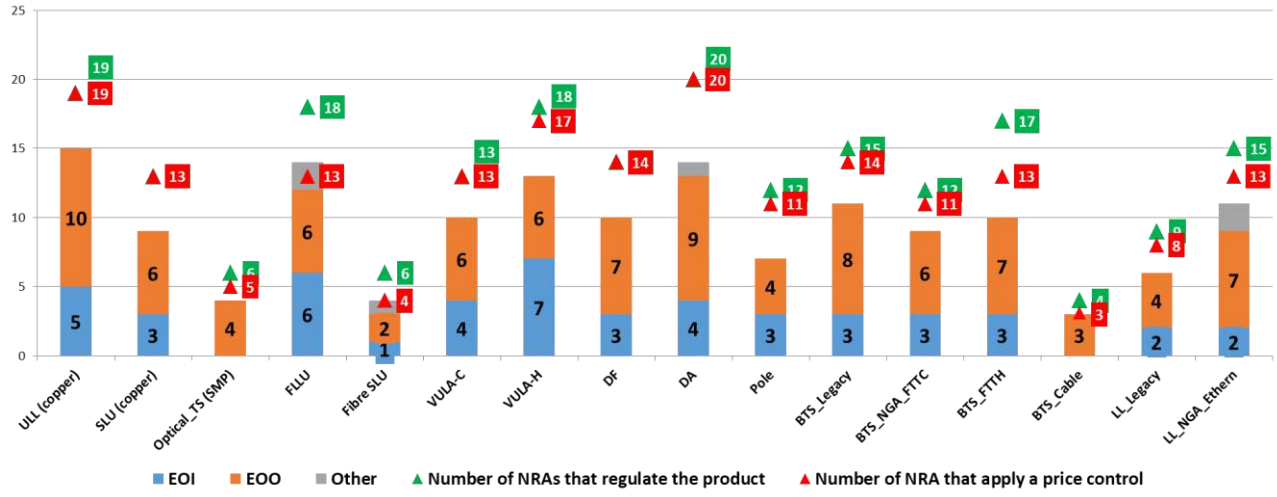




Equivalence model

The options for Equivalence models currently in force for different products are: EoI[76], EoO[77] and "Other"[78]. In absolute terms there is a small increase in the number of NRAs that impose EoI/EoO models even considering that less NRAs still regulate the market. In figure 29 the evolution over time is provided (only EU NRAs). A slightly increasing trend in the use of enhanced equivalence model can be seen on Duct access product as well as on FLLU.

Figure 28 – EOO-EOI equivalence model Number of NRAs

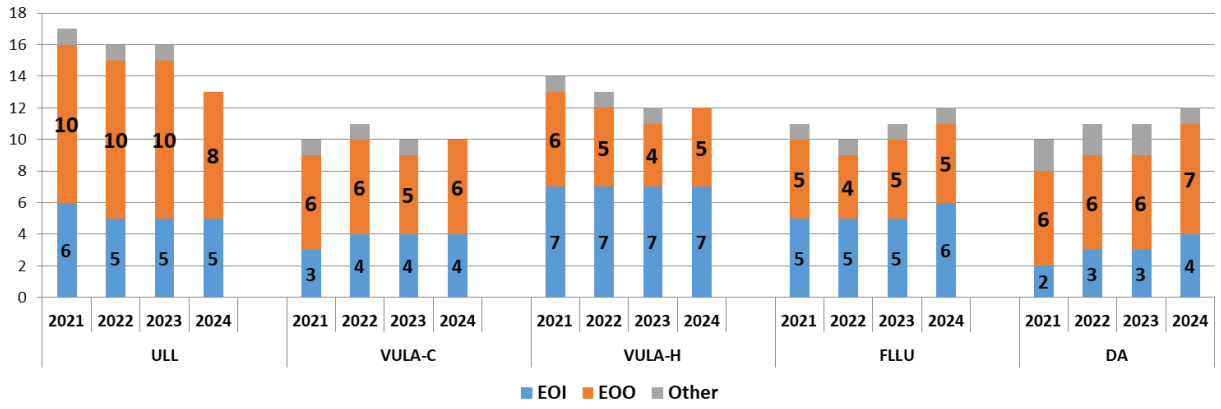


[76] 'Equivalence of Input (EoI)' means the provision of services and information to internal and third-party access seekers on the same terms and conditions, including price and quality of service levels, within the same time scales using the same systems and processes, and with the same degree of reliability 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.

[77] '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.

[78] 'Other' is a residual option for enhanced non-discrimination obligation not properly filed under EoI/EoO.

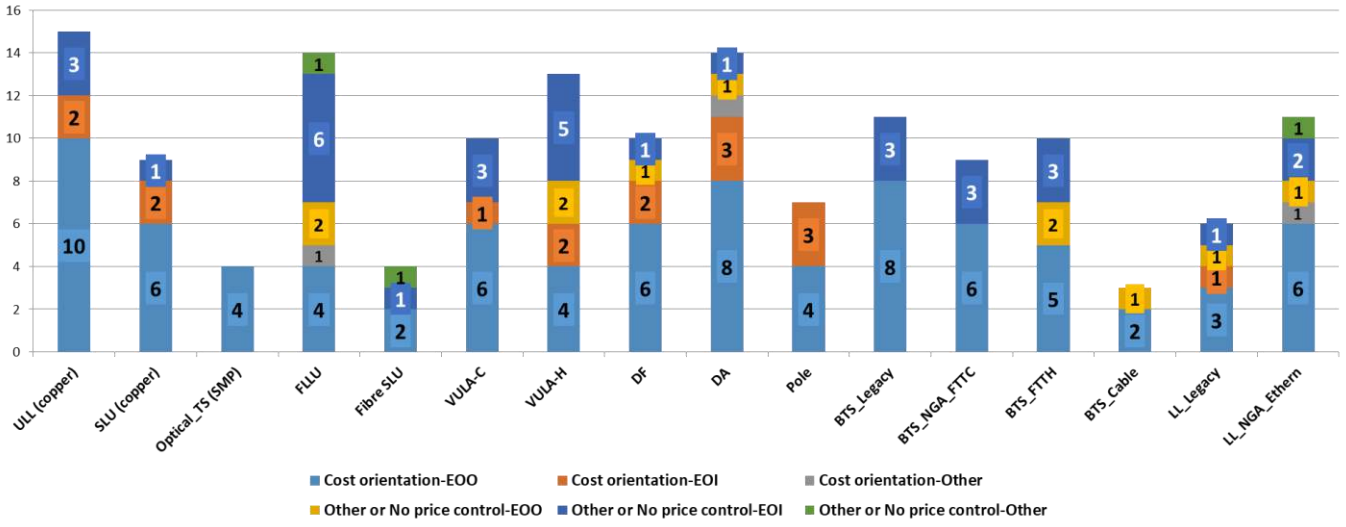
Figure 29 - Evolution over time of the Equivalence model applied (EU countries)



Source: BEREC RA Database 2024

In Figure 30 the number of NRAs that apply (or not) cost orientation in combination with the equivalence model EOI/EOO is reported. Among NRAs that replied to the questionnaire, the combination "cost orientation-EOO" is more frequent in case of legacy product or central access product whilst for FLLU/VULA-H "other/no price control-EOI" is also frequent or most frequent.

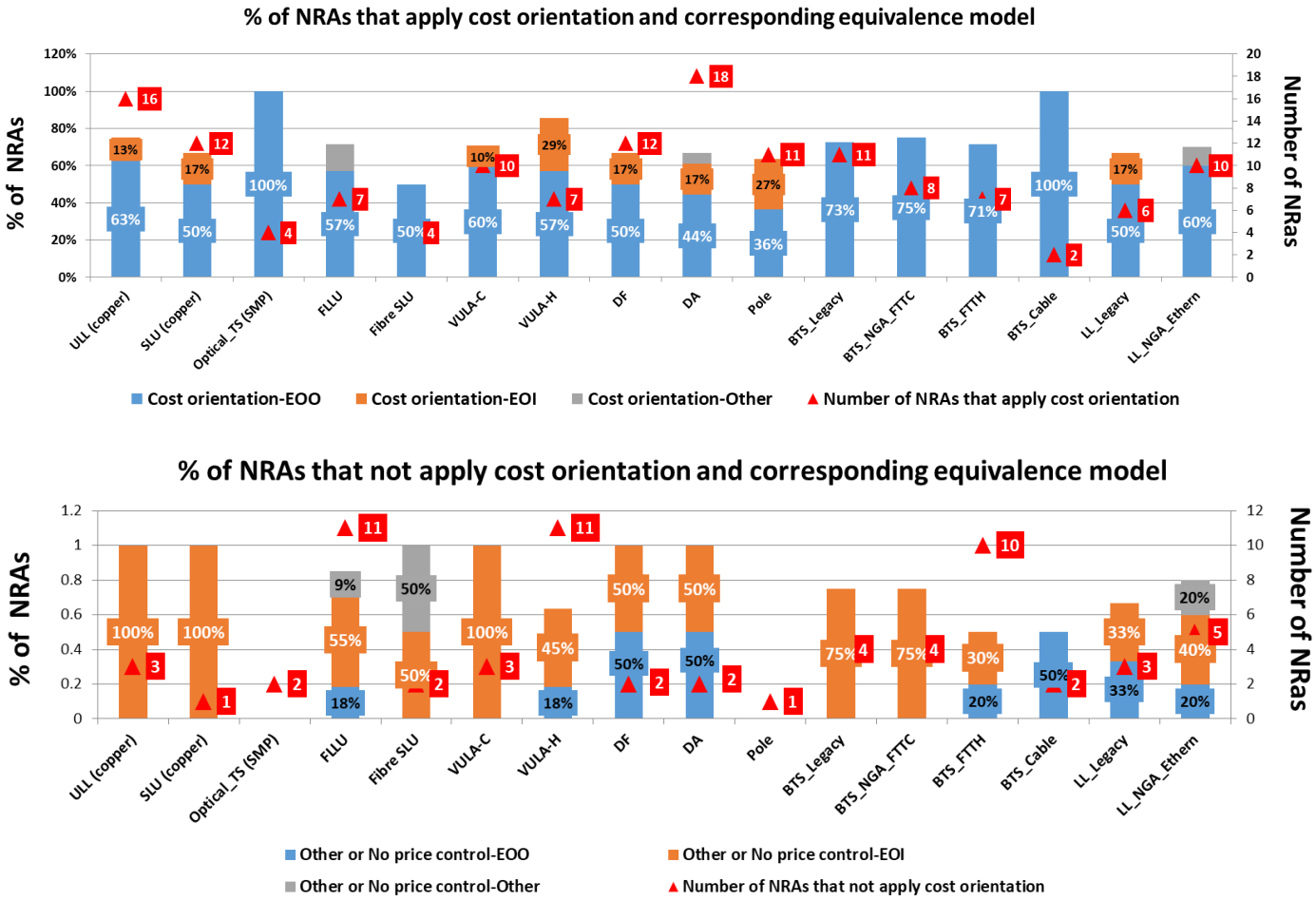
Figure 30 – EOO-EOI equivalence models with respect to the non-discrimination obligation



Source: BEREC RA Database 2024

Figure 31 reports the % of NRAs that apply a specific Equivalence model in combination with cost orientation (a) and the % of NRAs that apply a specific equivalence model but do not apply cost orientation (b). It seems that a relation exists between EOO adopted where also cost orientation is in charge, and price flexibility in combination with an EOI model.

Figure 31 – EoO-EoI equivalence model with respect to cost orientation obligation (a)-(b)



Source: BEREC RA Database 2024

In line with past year's report the role of EOI as a prerequisite for not applying cost orientation is investigated this year in combination with other elements highlighted in the new Gigabit Recommendation.

In general, EOI is chosen mainly in case of VULA-H as an equivalence model by the majority of NRAs that impose specific non-discrimination obligation. NRAs have been asked whether EOI has been imposed with the principal motivation for not imposing cost orientation.

The following table reports the replies provided by some NRAs that apply the EOI for the corresponding market/product, and the corresponding motivations with respect to the price control method. In general, EOI + ERT is a main motivation for not imposing cost orientation for fibre product following the indication of the Commission Recommendation of 2013 (SE, LU); in case of SI the EOI + ERT is relevant also for the legacy network product in combination with a technical replicability safeguard. In countries where ERT is also applied as price control method (ES) the EOI is not a main motivation for excluding the cost orientation specifically for legacy product. In IT, CY and PT the EOI didn't prevent the imposition of cost orientation.

	Have you considered EOI safeguard as principal motivation for not imposing cost orientation?	ULL	SLU	FLLU	VULA-C	VULA-H	DA	Poles	BTS_legacy	BTS_NGA_FTTC	BTS_NGA_FTTH	LL_Legacy	LL_NGA
NRAs that apply EOI as equivalence model	Yes	2	1	1	4	2	2	1	0	2	2	1	1
	No	2	2	0	0	1	3	2	3	1	0	1	1
	Yes	CZ SI	CZ	CZ	LU SI	CZ SE SI	CZ SI	LU SI	SI	SI	LU SI	SI	LU SI
	No	ES IT	ES IT			CY	CY IT PT	PT	IT	PT	ES	ES	ES
Motivation expressed from NRAs that adopt EOI	Yes	CZ: SMP operator is legally separated entity which provides only wholesale services to all potential retail providers (providing same inputs). Non-discrimination obligation incl. economic replicability test (between M1 a M3b products) is more appropriate. SE-SI-LU: EOI + ERT											
	No	IT: The EOI model has contributed to enhance the level playing field in the provision of wholesale service effectively reducing the incentive to adopt technical discriminatory conducts, with the benefit of the competition also in a forward looking manner providing efficient incentive to the operators to move up the ladder of investment. At the same time the EOI doesn't prevent the incumbent operator to apply excessive prices that can be passed through the end users or to prevent geographical selective price reduction under full efficient costs over the enhanced copper network or VHCN, with the final end to reduce the level playing field preventing investment in VHCN by competitor. ES: EOI included as a general criterion CY: EOI included as a general criterion PT (DA and Pole): It was considered necessary to impose cost orientation to prevent the SMP operator from setting prices significantly higher than costs in order to lead to a margin squeeze strategy for alternative operators.											

The survey on the motivation behind the choice of the Equivalence model chosen highlights the cases of BE, AT, EE, PL where EOO is in charge for some products: EOI has not been chosen due to a cost benefit analysis (EOI does not prevent wholesale price increases in combination with high cost of implementation) while EOO has been considered sufficient to prevent non-discriminatory practice, also in case of DA. In some cases, the low volume of wholesale access services does not justify the implementation of EOI.

In DK commitments are in place so there is no need to impose a specific equivalence model; for FI, where no specific Equivalence model is present, and a general non discrimination obligation is imposed, Traficom considers that in an environment with multiple SMP operators, the application of EOI could not produce competitive benefit. In case of LI the Equivalence model and the Replicability test are not applicable as the SMP operator has no downstream activity and all passive access FLLU is offered to independent service providers, including the previous incumbent, which has no own network / fibre infrastructure.

Some further questions on the implementation of the non-discrimination obligation have been included in light of the provisions of the new Gigabit Recommendation:

- ✓ Did you impose a technical replicability test[79]?
- ✓ Is it the task of the NRA or on the SMP operator to perform the test?

The focus is consistent with point 38 (b) of the new Gigabit recommendation where it is mentioned that technical replicability test can be taken into account when EOI is not fully implemented to grant price flexibility.

The replies to the previous questions are the following.

Did you impose technical replicability test?	ULL (copper)	SLU (copper)	Optical_TS (SMP)	FLLU	VULA-C	VULA-H	DF	DA	Pole	BTS_Legacy	BTS_NGA_FTTC	BTS_FTTH	BTS_Cable	LL_Legacy	LL_NGA_Ethern
Yes	6	4	0	4	4	7	2	2	0	6	3	5	1	2	3
Techincal replicability test and EOI	1	0	0	1	1	2	0	0	0	1	0	1	0	0	0
Techincal replicability test and EOO	4	3	0	2	2	3	2	2	0	4	2	2	1	2	1
Yes	BE EL FI FR NO SK	EL FI FR NO		BE FI NO SE	BE CY EL FI	BE CY DE EL ES FI NO	EL FR	BE EL		BE EL ES FI FR NO	BE EL FI	BE DE EL ES FI	BE	BE FR	AT BE FR
Techincal replicability test and EOI	SK			SE	CY	CY ES				ES		ES			
Techincal replicability test and EOO	BE EL FR NO	EL FR NO		BE NO	BE EL	BE EL NO	EL FR	BE EL		BE EL FR NO	BE EL	BE EL	BE	BE FR	BE

Who does the replicability test?	ULL (copper)	SLU (copper)	Optical_TS (SMP)	FLLU	VULA-C	VULA-H	DF	DA	Pole	BTS_Legacy	BTS_NGA_FTTC	BTS_FTTH	BTS_Cable	LL_Legacy	LL_NGA_Ethern
NRA	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**1**	**0**	**2**	**0**	**0**	**0**
SMP operator	**5**	**3**	**0**	**3**	**4**	**5**	**1**	**2**	**0**	**4**	**3**	**3**	**1**	**1**	**2**
NRA						**DE ES**				**ES**		**DE ES**			
SMP operator	**BE EL FI NO SK**	**EL FI NO**		**BE FI NO**	**BE CY EL FI**	**BE CY EL FI NO**	**EL**	**BE EL**		**BE EL FI NO**	**BE EL FI**	**BE EL FI**	**BE**	**BE**	**AT BE**

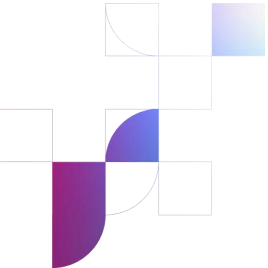
The technical replicability test is done in few cases where EOI is not implemented, but EOO is already in charge, and in even fewer cases it is applied in combination with an EOI model for the provision of the wholesale services. The technical replicability test in this way is a procedural instrument to enforce the EOO model in charge.

The technical replicability test is more frequently applied by the SMP operator instead of the NRA. In BE, based on a case by case approach, the NRA may request the SMP to run a technical replicability test; in CY the NRA audit the SMP operator even if the responsibility is in charge of the SMP operator; in AT any changes in retail product characteristic have to be notified to the NRA and the SMP operator has to show that all (new) features are replicable. The technical replicability of the retail offer has not been imposed in CZ where the SMP operator is a legally separated entity which provides only wholesale services to all potential retail providers (providing same wholesale inputs, same quality and same ordering systems). Therefore, there is no need for a technical replicability test. In SE the technical replicability test has never been applied, since EOI is the preferred equivalence model for fiber wholesale access. In LV, specific KPI reporting together with SLA and SLG have been imposed and considered proportionate in consideration of the current demand at wholesale level for enforcing non discrimination and a level playing field.

[79] The technical replicability test has the objective to verify that SMP operators which are subject to a non-discrimination obligation to provide access seekers with regulated wholesale inputs that allow the access seeker to effectively replicate new retail offers of the downstream retail arm of the SMP operator from a technical perspective. NRAs should ensure that internal and third-party access seekers have access to the same technical and commercial information on the relevant regulated wholesale input, without affecting applicable rules on business confidentiality. The required technical replicability test can be carried out by either the SMP operator or the NRA. If the SMP operator conducts the technical replicability test itself, the NRA should require the SMP operator to provide it with the results of the test, including all information needed to demonstrate that technical replicability is fully ensured. Alternatively, if the NRA conducts the technical replicability test, it should require the SMP operator to notify to the NRA the details of the new retail offers that make use of a particular relevant regulated wholesale input, together with all the information needed for the NRA to assess replicability, with sufficient notice before the launch of such retail offers.

To complete the survey, in the next table we summarise how the provisions of art. 38 a-d of the new Gigabit recommendation that are already considered in the national regulatory framework in combination with some other relevant information concerning price flexibility of the VHCN product and cost orientation of the legacy NGA product where present.

The first 7 columns summarise the information collected that can be attributed to article 38 a-d(iii) and the information referred to VHCN products (VULA-H and/or FLLU): i) Equivalence model adopted on VHCN wholesale product; ii) technical replicability test; iii) monitoring system; iv) availability of the Economic replicability test; v) Commitment of the SMP operator on VHCN investment plan; vi) the presence of an anchor product; vii) main diver on competition in regulated areas. The information on the presence of a cost-oriented legacy NGA product is also relevant even if the NRAs did not consider it explicitly as an anchor product in the sense of the new Gigabit recommendation. In the same table the status of the geographical regulation as analysed in previous sections as well as the relevance of the access to civil infrastructure is reported. For the first two groups of countries where the NGA legacy product is still available and remedies are applied including FTTC al local level, flexibility of VHCN is always accompanied with one or more provisions of the Commission Recommendation, more frequently the availability of EOI or a regulated anchor. When price flexibility is not applied the provision of the art. 38 are generally not in charge. For the group of countries where an anchor over NGA is not present the provisions of the Gigabit recommendation are less relevant, as in this case commitments and commercial agreements, symmetrical regulation and civil infrastructure access can play a role.



	Art. 38 a	Art. 38 b		Art. 38 c	38 d(ii)	38 d (iii)	38 d(i)				
	Equivalence model for FTTH/ functional separation separated	technical replicability	Monitoring system	Economic replicability test	Commitment from the SMP on VHCN Plan	anchor product	main driver of competition in non comptitve areas	cost orientation on VHCN?	cost orientation on VULA-C?	Competitive areas + Deregulated on geographical approach to regulation	Relevance of Civil Infrastructure access
(BE-)	EOO	Yes	Yes	ex-post MS test			SMP regulation	No	Yes	<5%	No
(HU-4)	EOO						infrastructure competition through cable platform/own FTTH network	Yes	Yes	<20%	No
(EE-3)	EOO	No	No	ex-post MS test				Yes	Yes		Very relevant
(SI-)	EOI			ERT (Economic Replicability Test)				No	No	<50%	
(SK-)	EOI			ERT (Economic Replicability Test)				No	No		
(HR-3)	EOO			ex - ante MS test				Yes	Yes	<40%	
(FI->5)		Yes						Yes	Yes	<5%	No
(IT->5)	EOI	No	Yes	ex - ante MS test			by SMP regulation	Yes	Yes	<15%	Small
(CZ-3)	EOI (structurally separated)	No	No	ex - ante MS test			by SMP regulation	No	No	<95%	
(DE-)		Yes	Yes		Yes	Yes		No	Yes	0%	Forward loking
(EL-)	EOO	Yes	Yes	ERT (Economic Replicability Test)			by SMP regulation	Yes	Yes	0%	
(IE-4)				ex - ante MS test		Yes		No	Yes	<20%	Farwad looking
(CY-)	EOI	Yes	Yes	ERT (Economic Replicability Test)			SMP regulation (VULA)	Yes	Yes	<10%	
(LU-)	EOI			ERT (Economic Replicability Test)				No			
(LV-2)		No	Yes	0				No		<30%	Farward looking
(NO-5)	EOO	Yes	Yes	ERT (Economic Replicability Test)			By infrastructure competition through cable platform/own FTTH network	No			Small
(ES-3)	EOI	Yes	Yes	ERT (Economic Replicability Test)	Yes	Yes	SMP regulation, by infrastructure competition through access SMP civil infrastructure and infrastructure competition through own FTTH network	No		<70%	Vary relevant
(MT-)								No			No
(PL-)	EOO							Yes		<50%	
(LT-)				ex-post MS test				Yes		0%	Very relevant
(PT-2)	EOI	No	Yes					No		<95%	Very relevant
(DK-)		No	No	A price squeeze test is an element in the commitments. The test is carried out by the operator			By SMP regulation (FLLU, VULAH)	No		<95%	No
(FR-3)								No		<40%	Very relevant to reach access point
(LI-5)	(structurally separated)						by SMP regulation	Yes			Small
(SE-)	EOI	Yes	No	ERT (Economic Replicability Test)		Yes		No			
(RS-3)							by SMP regulation	No			
(BG-)		No	No					No			Small
(AT-1)							SMP regulation (LL)	No			
(NL-)								No			
(RO-)								No			

3.3 Costing methodologies: Cost allocation methodologies, Cost base, annualisation

The section shows costing methodologies for each wholesale regulated product. We consider it important to understand, if the current regulatory framework adopted by NRAs on costing methodology already considers the provisions of the Gigabit recommendation.

Cost Allocation

In the figure below the status of the main cost allocation methodologies used for each product are reported, considering both the main categories and sub categories taken into account.

Figure 32 - Cost Allocation methods main categories(a) sub categories (b)

	ULL (copper)	SLU (copper)	Optical_ TS (SMP)	FLLU	Fibre SLU	VULA-C	VULA-H	DF	DA	Pole	BTS_Legacy	BTS_NGA_FTTC	BTS_FTTH	BTS_Cable	LL_Legacy	LL_NGA_Ethern
FDC	4	1	1	5	1	1	2	4	8	4	3	2	4	1	1	3
LR_A_IC	8	6	3	3	2	6	4	5	7	3	6	5	4	1	3	5
LRIC	5	4	1	1	0	2	3	3	4	2	3	1	2	1	2	3
FDC	EE FI LT RS	LT	LV	EE FI LI LT LV	LT	EE	EE LV	AT LI LT RS	BG EE FR LI LT LV NO RS	BG FR LV NO	EE LT RS	EE RS	EE LT LV RS	RS	FR	AT HU IE
LR_A_IC	BE DE EL FR HR IT NO PL	DE EL FR IT NO PL	HR IT PL	BE HR PL	HR PL	BE DE EL HR IE IT	BE EL HR IT	DE EL IE IT PL	BE DE EL HR IE IT PL	IE IT PL	BE DE EL HR NO PL	BE DE EL HR PL	BE EL HR PL	BE	BE DE EL	BE DE EL HR IT
LRIC	CY ES HU LU SI	CY ES HU LU	HU	HU		CY HU	CY ES HU	CZ HU SI	ES HU SI SK	ES HU	ES HU SI	HU	ES HU	HU	CY SI	CY LU SI

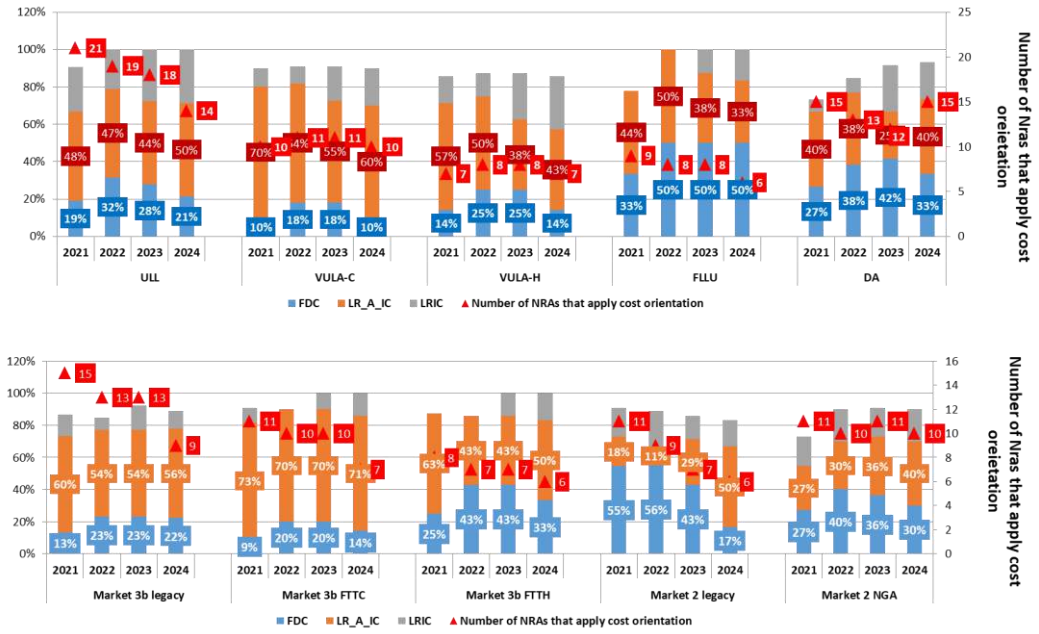
	ULL (copper)	SLU (copper)	Optical_ TS (SMP)	FLLU	Fibre SLU	VULA-C	VULA-H	DF	DA	Pole	BTS_Legacy	BTS_NGA_FTTC	BTS_FTTH	BTS_Cable	LL_Legacy	LL_NGA_Ethern
TD-LR(A)IC+	2	2	1	1	1	1	0	2	2	1	2	2	1	0	1	1
BU-LR(A)IC+	6	4	2	2	1	4	4	2	4	1	4	3	3	1	2	3
BU-LRIC	5	4	1	1	0	2	3	3	4	2	3	1	2	1	1	2
TD-LR(A)IC+	DE PL	DE PL	PL	PL	PL	DE		DE PL	DE PL	PL	DE PL	DE PL	PL		DE	DE
BU-LR(A)IC+	BE EL FR HR IT NO	EL FR IT NO	HR IT	BE HR	HR	BE EL HR IT	BE EL HR IT	EL IT	BE EL HR IT	IT	BE EL HR NO	BE EL HR	BE EL HR	BE	BE EL	BE EL IT
BU-LRIC	CY ES HU LU SI	CY ES HU LU	HU	HU		CY HU	CY ES HU	CZ HU SI	ES HU SI SK	ES HU	ES HU SI	HU	ES HU	HU	CY	CY LU

Source: BEREC RA Database 2024

In figure 33 the time evolution over the last four years is reported considering all EU NRAs that have declared “cost orientation” as the main category for price control obligation.[80]

Figure 33 - Cost Allocation methods main categories time series 2021-2024 (for EU NRAs that declared cost orientation as price control method)

[80] It should be said that the when LRAIC is in use for duct access/ pole access/dark fiber it is possible that this is applied only for new infrastructures for fiber deployment, instead cost for old infrastructures are evaluated through an FDC approach (i.e. IE). For ES in the decision of 2021 concerning the prices for the access to SMP operator´s physical infrastructure, CNMC set the prices for civil engineering assets according to the BU-LRIC methodology. As a result of such decision the FDC methodology (based on SMP operator´s regulatory accounting) is only applied to (i) assess the consistency of the results of the BU-LRIC methodology and (ii) obtain the level of depreciation of civil engineering assets. The latter (i.e. the percentage of the accumulated depreciation) is used to adjust the value (current costs) of the civil engineering assets for the depreciation.



Source: BEREC RA Database 2024

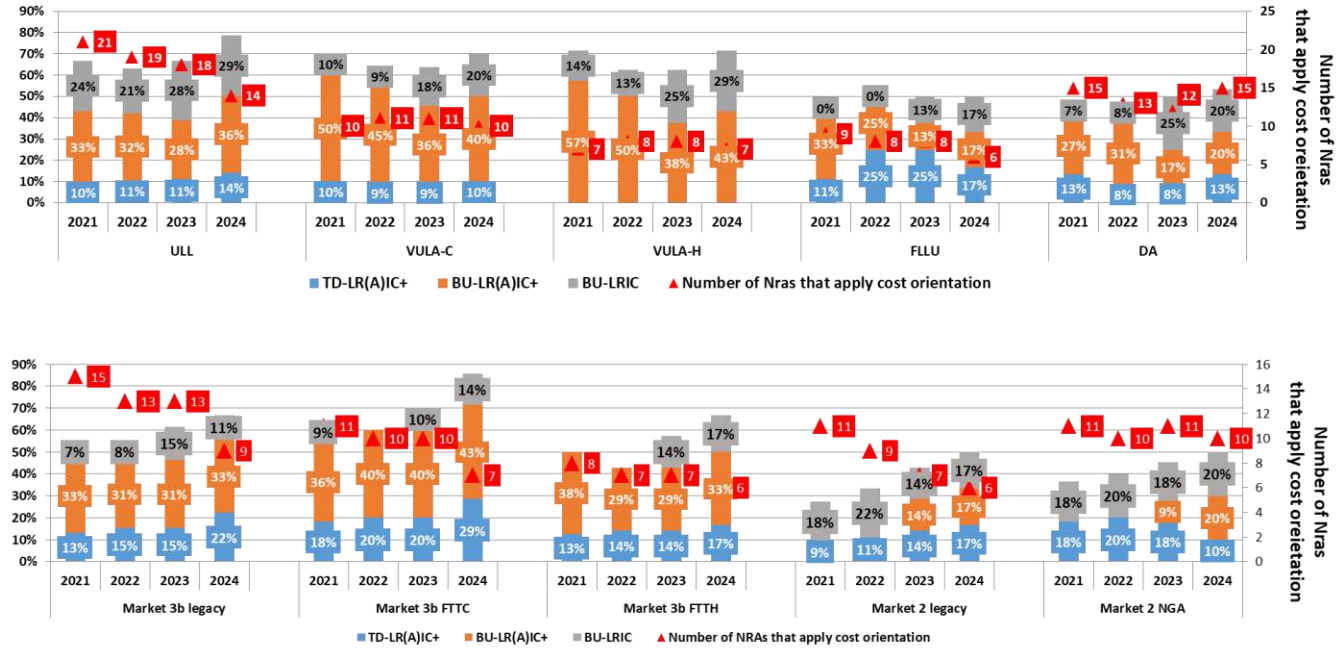
The most frequent cost allocation approach remains LRIC/LR(A)IC for almost all products/markets. FDC is a frequent approach for DA, but has been decreasing since last year. Those NRAs that have removed regulation had applied a LR(A)IC approach in the past. FDC is also declared frequently for FLLU. No changes from LR(A)IC to FDC can be observed over time.

The modelling approach is generally the preferred option where cost orientation is applied as a price control method (the number of EU NRAs that apply cost orientation has been decreasing over time for legacy products i.e. for LLU 21 NRAs in 2021 to 14 NRAs in 2024 and for legacy market 3b from 15 in 2021 to 9 in 2024) confirming a reduction of the regulatory pressure as competitive conditions improve. This dynamic is less evident for VHCN products, while for on civil infrastructure access the number of NRAs that apply cost orientation is increasing.

In Figure 34 the sub categories of allocation methodologies since 2021[81] are reported in terms of the percentage of NRAs that apply cost orientation as price control method. The main outcome is that when LR(A)IC/LRIC has been chosen as the main category, the most common approach is Bottom-up.

Figure 34 - Allocation methods LR(A)IC-LRIC sub categories

[81] 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 2024

Cost base

With reference to the cost base, Figure 35 shows that in 2024 CCA is still by far the most commonly used methodology for all markets, including DA. The situation remained stable in comparison to last year's survey.

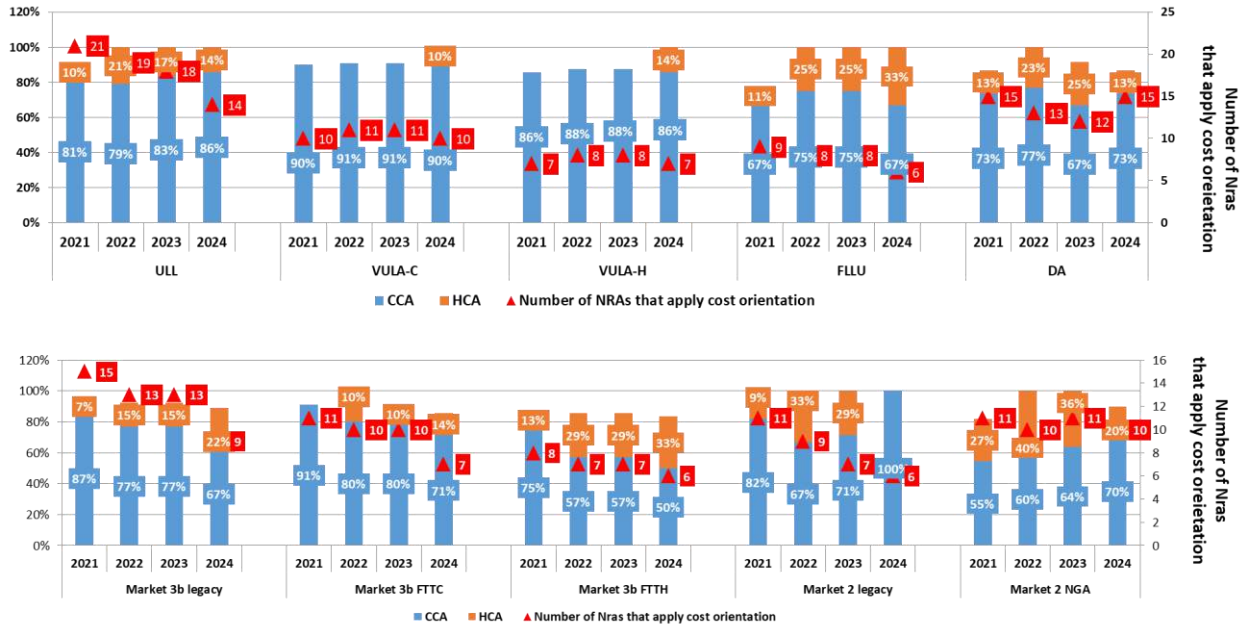
In the following Figure 35 the type of cost base in use when cost orientation is applied as price control is shown, it should be noted that HCA is only chosen in combination with an FDC allocation method (even when there is a modeling approach where not all the asset base is evaluated at current cost, but already depreciated assets are taken into account).

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. The use of CCA is the most used approach where cost orientation is applied.[82] In market 2, HCA is still more frequent in relative terms where cost orientation is applied. The use of HCA is common where NRAs are at the early stage of regulation they move to CCA before (eventually) deregulating., HCA is also used for civil infrastructure access (duct and pole) but also for dark fiber when reusable civil infrastructures are included in the costing methodology.

[82] 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 35 - Cost base used

	ULL (copper)	SLU (copper)	Optical_TS (SMP)	FLLU	Fibre SLU	VULA-C	VULA-H	DF	DA	Pole	BTS_Legacy	BTS_NGA_FTTC	BTS_FTTH	BTS_Cable	LL_Legacy	LL_NGA_Ethern
CCA	14	10	5	6	3	9	9	10	14	8	9	6	6	3	7	9
HCA	3	2	0	3	1	1	1	2	4	1	3	1	2	0	0	2
CCA	BE CY DE EL ES FI FR HR HU IT LU PL RS SI	CY DE EL ES FI FR HU IT LU PL	HR HU IT LV PL	BE FI HR HU LV PL	FI HR PL	BE CY DE EL FI HR HU IE IT	BE CY EL ES FI HR HU IT LV	AT CZ DE EL HU IE IT PL RS SI	BE BG DE EL ES FR HR HU IE IT LV PL RS SI	BG ES FR HU IE IT LV PL	BE DE EL ES FR HU PL RS SI	BE DE EL HU PL RS	BE EL HU LV PL RS	BE HU RS	BE CY DE EL ES FR SI	BE CY DE EL HR IE IT LU SI
HCA	EE LT NO	LT NO		EE LI LT	LT	EE	EE	LI LT	EE LI LT NO	NO	EE LT NO	EE	EE LT			AT HU



Source: BEREC RA Database 2024

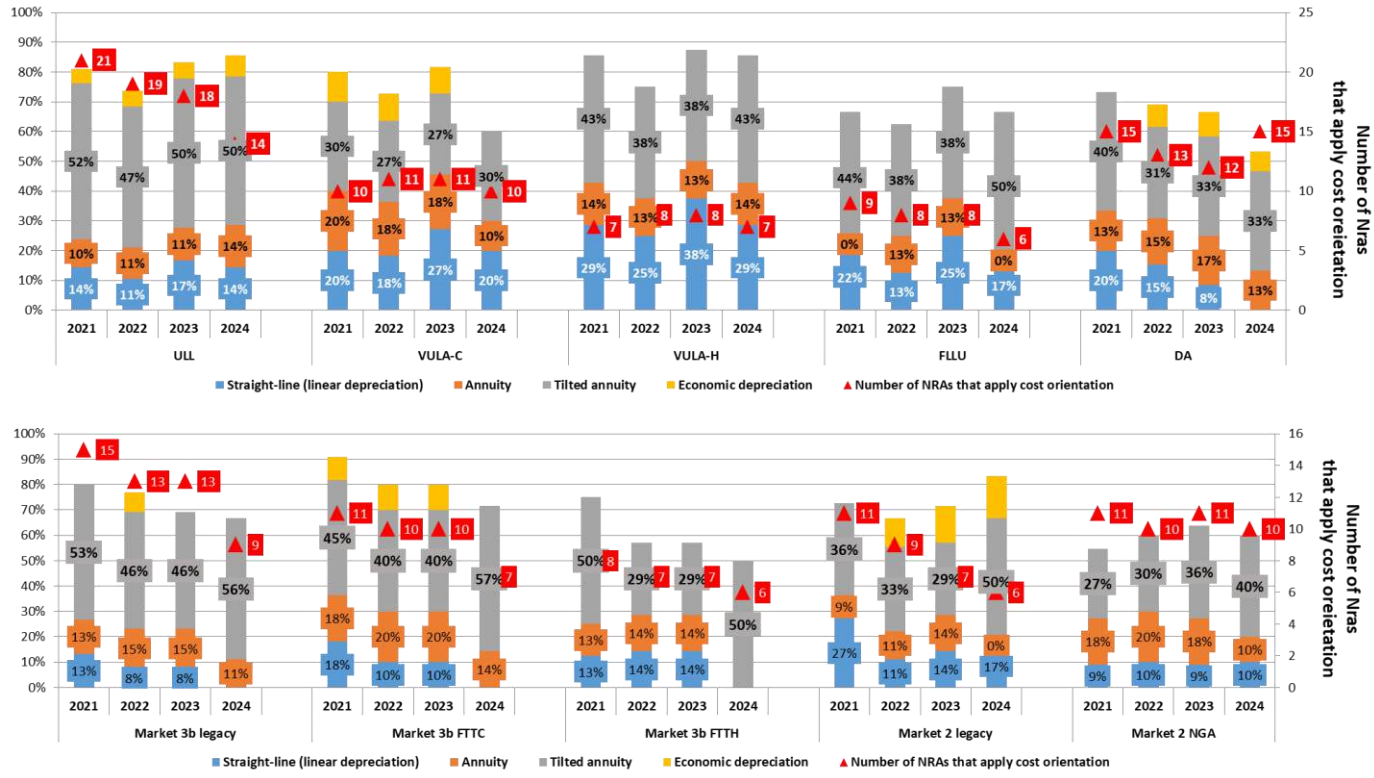
Annualisation

Annualisation methodologies within the CCA category are represented in Figure 36 when price control method is cost oriented.

The most frequently used approach is the tilted annuity. Standard annuity and straight line follow. The number of NRAs refers to the number of NRAs that apply cost orientation as the main category for the corresponding product. In general, NRAs that deregulate the market had previously introduced economic depreciation/Tilted annuity approach as an economic cost signal.

Figure 36 – Annualisation method when price control method is cost oriented

	ULL (copper)	SLU (copper)	Optical_TS (SMP)	FLLU	Fibre SLU	VULA-C	VULA-H	DF	DA	Pole	BTS_Legacy	BTS_NGA_FTTC	BTS_FTTH	BTS_Cable	LL_Legacy	LL_NGA_Ethern
Straight-line (linear depreciation)	3	2	1	2	1	2	3	2	3	2	1	1	2	1	1	1
Annuity	2	2	1	0	0	1	1	2	2	1	1	1	0	0	0	1
Tilted annuity	8	5	3	3	2	3	3	6	6	3	6	4	3	1	3	5
Economic depreciation	1	1	0	1	0	1	2	0	1	1	0	0	1	1	1	0
RAV (Regulatory Asset Value)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Straight-line (linear depreciation)	CY FI RS	CY FI	LV	FI LV	FI	CY FI	CY FI LV	AT RS	IE LV RS	IE LV	RS	RS	LV RS	RS	CY	CY
Annuity	DE IT	DE IT	IT			IT	IT	DE IT	DE IT	IT	DE	DE				IT
Tilted annuity	BE EL FR HR HU LU PL SI	EL FR HU LU PL	HR HU PL	HR HU PL	HR PL	EL HR HU	EL HR HU	CZ EL HU IE PL SI	EL FR HR HU PL SI	FR HU PL	BE EL FR HU PL SI	BE EL HU PL	EL HU PL	HU	EL FR SI	EL HR IE LU SI
Economic depreciation	ES	ES		BE		IE	BE ES		ES	ES			BE	BE	ES	
RAV (Regulatory Asset Value)																



Source: BEREC RA Database 2024

3.4 Implementation of costing methodologies in light of NDCM Recommendation and new Gigabit Recommendation

This section provides an update on the status of implementation of the NDCM (2013/466/EU)", with regard to costing methodologies for products mainly in market 1. Information on the implementation of the provision of the new Gigabit recommendation is also included independently from the relevant legal basis on which the methodology is implemented, considering the fact that most of the principles of the methodology of the new Gigabit Recommendation were already stated in the previous Recommendation. Thus, benchmarking on the current status of the costing methodologies implementation at EU level is provided.

The new Gigabit Recommendation does not modify the general framework already provided in the NDCM concerning the costing methodology and many elements that were already available in the first Recommendation are still valid in the new framework.

First of all the costing methodology should be applied to relevant cost oriented products in market 1 on legacy technology, NGA as well as VHCN. The Recommendation is therefore very relevant for all NRAs that apply cost oriented prices on the legacy copper network, enhanced products on copper network, specifically when those products play the role of an anchor for VHCN. Most NRAs have not yet considered the new Framework as the current decisions are still based on the old NDCM framework.

To take into account this condition, an updated questionnaire has been considered, for this purpose taking into account both the NDCM Recommendation and the new Gigabit Recommendation.

Therefore, NRAs were asked in continuity with past years, how they implement the framework of the NDCM Recommendation in Market 1, by choosing the following options: i) Rec. 30-37 (CCA-BU LRIC+); or ii) Rec. 40; iii) Rec. 42.

At the same time main points of the topic costing methodology in the new Gigabit Recommendation have also been considered in the monitoring process[83]:

[83] Rec. 48-49: "NRAs should adopt a BU LRIC+ costing methodology that estimates the current cost that a hypothetical efficient operator would incur to build a modern efficient network, which is a VHCN."
Rec. 50: "When modelling a VHCN, NRAs should define a hypothetical efficient VHCN: capable of delivering the targets set out in Decision (EU) 2022/2481, in terms of bandwidth and coverage, as well as taking take-up into account; NRAs should include in the modelled network any existing civil-engineering assets that are generally also capable of hosting a VHCN; civil-engineering assets that will have to be newly constructed to host a VHCN; NRAs should not assume the construction of an entirely new civil-engineering infrastructure network for deploying a VHCN."
Rec. 51-52: "Reusable civil-engineering assets should be valued taking into account the already depreciated value: NRAs should value civil-engineering assets and their corresponding RAB on the basis of the indexation method. Specifically, NRAs should set the RAB for that type of asset at the regulatory accounting value net of accumulated depreciation at the time of calculation, indexed by an appropriate price index, such as the retail-price index ('RPI') that will have to be newly constructed to host a VHCN."
Rec. 53-54: "NRAs should lock in the RAB corresponding to civil-engineering assets and then roll it forward from one regulatory period to the next"; alternatively "they may decide to value reusable legacy civil-engineering assets and their corresponding RAB on the basis of current costs adjusted for depreciation over the lifetime of the assets."
Rec. 56: "NRAs should adjust the cost calculated for the modelled VHCN to reflect the different features of wholesale access services that are not based on a VHCN. For that purpose, the NRAs should estimate the cost difference between an access product based on, for example, fibre to the home ('FTTH') and an access product based on copper by replacing the optical elements with efficiently priced copper elements, where appropriate, in the VHCN engineering model. Where appropriate, NRAs could otherwise obtain the copper cost by modelling a VHC overlay network, where two networks (copper and FTTH) share to an extent the same civil-engineering infrastructure."

Only one NRA (HR) that updated the costing methodology during 2024 has declared to be compliant with the new Gigabit recommendation; in all other cases the regulatory framework is still based on the previous NDCM Recommendation.

Figure 37 reports NRAs that applied the corresponding costing methodology. The information is given at the level of a single relevant product (ULL, FLLU, VULA-C, VULA-H and duct access) and the main category for price control chosen.[84] It should be pointed out that, when NRAs apply the Commission Recommendations approach, the same is applied for all products/markets where costing methodology is required to implement the corresponding price control. At the same time this does not mean that all products regulated with specific price control always apply the same costing methodology principles (i.e. for Duct Access); this is in line with the general principle that all access services are coherently priced along the network value chain. We can see that from the following analysis 20 NRAs have provided information on the fact that for some products/markets the regulatory framework in terms of costing methodology refers to the NDCM Recommendation (BE, CY, CZ, DE, EE, EL, ES, FI, FR, HR, HU, IE, IT, LI, LV, NO, PL, RS, SE, SK).

- Rec. 62: “NRAs should update the data input into the costing methodology not more than twice during each market review period… NRAs should publish the updated outcome of the costing methodology and resulting access prices over the relevant two and-a-half-year period.”
- Point 54: “NRAs should set individual prices for access to the newly built civil-engineering infrastructure assets, applicable within the area concerned. In principle, civil-engineering infrastructures which are merely repaired, renovated or maintained should not be considered as newly built.”
- Point. 55: “Active copper lines are decreasing as customers migrate to cable, fibre or mobile networks. Modelling a single, efficient VHCN for copper and VHCN access products would neutralise the inflationary volume effect that arises when, modelling a copper network, fixed network costs must be distributed over a decreasing number of active copper lines. It is possible to progressively transfer the traffic from copper to VHCNs by deploying – and switching to – VHCNs. Only traffic moving to other infrastructures (e.g. cable, mobile) would result in a rise in unit costs.”

[84] The information is reported for all relevant products, even if the NDCM recommendation was only focus on copper legacy product such as ULL, to better reflect the evolution of the regulatory framework of the new Gigabit recommendation where the costing methodology is related to all cost-oriented product in access market.

Figure 37 - NRA implementation of EC Recommendations

	Cost orienation					other combination					Retail minus				
	ULL (copper)	FLLU	VULA-C	VULA-H	DA	ULL (copper)	FLLU	VULA-C	VULA-H	DA	ULL (copper)	FLLU	VULA-C	VULA-H	DA
Recommendation_2013_466_EU_NDC	12	5	8	6	12	3	3	2	4	1	0	0	0	1	0
Reccomendation_2024_539_EU_GigabitRec	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
NRAs that adopted NDCM	CY DE EE EL ES FI FR HU IT NO PL RS	EE FI HU LI PL	CY DE EE EL FI HU IE IT	CY EE EL FI HU IT	DE EE EL ES FR HU IE IT LI LV RS SK	CZ SI SK	CZ LV SK	CZ SK	BE CZ LV SK	SI				ES	
NRAs that adopted the Gigabit Recomendation	HR	HR	HR	HR											

	Cost Orientation				
	ULL (copper)	FLLU	VULA-C	VULA-H	DA
Recommends_30_37_CCA_BU_LRIC_P	7	2	6	5	3
Recommend_40	2	3	1	1	3
Recommends_30_37_CCA_BU_LRIC_P	CY DE EL FI FR HU IT	FI HU	CY EL FI HU IE IT	CY EL FI HU IT	EL IE IT
Recommend_40	EE PL	EE LI PL	EE	EE	EE LI LV

	Other/combination				
	ULL (copper)	FLLU	VULA-C	VULA-H	DA
Recommends_30_37_CCA_BU_LRIC_P	1	1	1	2	0
Recommend_40	0	1	0	1	0
Recommends_30_37_CCA_BU_LRIC_P	CZ	CZ	CZ	BE CZ	
Recommend_40		LV		LV	

Source: BEREC RA Database 2024

Other specific remarks by NRAs are reported below.

Country	Comment on the application of the regulatory framework
BE	Copper prices were set prior to the 2013 Rec. VULA FTTH is still not available, but however rental fees are set with a Fair pricing (reasonable margin above costs) and checked considering a BU-LRIC+ approach in line with the methodology of the Commission Recommendation
CZ	CTU follows the Recommendation where applicable, as the SMP operator CETIN has not been imposed a cost orientation obligation on LLU, in light of the structural separation in charge. Recommendations are irrelevant in this respect. Nevertheless, this is only current situation, before lifting cost orientation on LLU in 2018, prices were set in line with the methodology set in Recommendation.
DK	Currently, the DBA doesn't apply LRAIC directly in a price decision, however LRAIC it is used to benchmark two companies in the two pricing decisions.
FI	Due to supreme court decision (11/2020) price caps are no longer valid and LRIC-model, as it is, cannot be implemented for 3 biggest operators. Situation of the update of the model is open.
HR	The BU-LRIC+ cost model on which basis costs of the regulated wholesale services are calculated was developed in 2020/2021 for application in 2022. Therefore, formally Recommendation from 2013 was applied, but, as there is no significant difference, it can be concluded that also Gigabit recommendation is fully applied.

IT	The costing methodology adopted for cost orientation obligation had been consulted and adopted before the Gigabit recommendation was finally adopted in 2024. An assessment of the compatibility of the new framework have been address finding no specific contrast in the costing methodology implementation in applying the regulatory framework of the 2013 Recommendation with respect to the new Gigabit Recommendation.
LI	The applied costing model meets Rec. 40. The SMP provider is open access provider to fibre LLU and ducts, without downstream activities. The fibre access network was built efficiently in short period / one project, in existing infrastructure (ducts). Therefore, such condition, the costing model is equivalent to the CCA BU-LRIC+ approach even if price control it is based on FDC-HCA costing methodology in light of the fact that all depreciated reusable asset are excluded from computation and the short time of the construction.
LT	According the situation of Lithuania, RRT doesn't plan to build LRIC+ model, because of: SMP network was build long time ago, so in the light of "build or buy" decision, the SMP's asset indexed by current value, would give enormous incomes, comparing to current ones; b) 50-80% of total costs is costs for long-term assets depreciation; c) current prices in Lithuania are very low, comparing to EU level; d) implementation of LRIC model in Lithuania would increase level of wholesale services prices, so retail prices level as well. RRT believes that this scenario and possible results of LRIC model would contradict aims mentioned in ex-article 8 of 2002/21/EU directive. e) investments in NGN in Lithuania is very high. f) volume of services (copper access products) is highly decreasing yearly.
PL	Cost orientation, but with a TD model The applied costing model Rec. 40. The CCA – TD LRIC+.
NO	The model calculates asset requirements on a bottom-up basis with a mark-up to recover common cost. The model uses a RAB for all copper assets which means that the approach is not a LRIC calculation for the copper network
SI	Obligation of ERT and technical replicability test without cost orientation, BU-LRIC model is used for some input of the test and co-location
SK	Obligation of ERT without cost orientation, BU-LRIC model is used for some input of the test and co-location
MT	not relevant anymore

From the previous remarks and information, we understand that the principles of the Commission Recommendations are in most part addressed by NRAs.

In this year's report, the year of the last methodology update as well as the last model update, where relevant, were requested. The choice of the methodology and the model update are not always synchronous for all services (highlighted in blue and red). For most NRAs the update of the methodology and/or the models happens synchronously for all relevant products, but in some cases there are differences: for DE the last update for VULA-C was in 2021 when for all other product it was in 2022; for IE the VULA-C was implemented in 2021 while civil infrastructure in 2024[85]. Considering the last five years, 11 NRAs updated the costing methodology and/or the model for VULA-C and FLLU, VULA-H services (BE, CZ, DE, DK, EL, HR, HU, IE, IT, LI, LV) over 19 NRAs that provided the relevant information. In some cases only copper LLU has been considered as relevant for the costing methodology updates (FR, NO,[86] SI, RS). Among the 11 NRAs that have updated the methodology or the model in the last five years, cost orientation is applied only by 6 NRAs over VULA-C (DE, EL, HR, HU, IE, IT)[87] and 5 over VULA-H/FLLU (EL, HR, HU, IT, LI).

[85] The VULA model has not updated since 2021 as pricing continuity adopted, under which the incumbent can increase the FTTC VUA price by up to CPI-0, provided the FTTC VUA price does not exceed the lowest FTTH VUA price. https://www.comreg.ie/media/dlm_uploads/2024/01/ComReg2405.pdf

[86] For NO VULA-H where "other/combination" have been declared as main price control method, the update is done every year.

[87] For BE (cost orientation on VULA-C is imposed, but price is still not available and price for bitstream over FTTC that are also cost oriented has been defined before 2013).

Year	Methodogy update		Model update	
2017	3	CY,FI,HU	1	EE
2018	1	SK	3	CY,NO,SK
2020	1	DK	2	EL,HU
2021	2	BE,IE	5	BE,DK, IE,*ES,RS*
2022	3	DE, *LV*,SI	3	DE,HR,SI
2023	4	EE,EL,FR,LI	2	FR,LI
2024	2	HR,IT	1	IT
Total	16		17	

With regard to procedural issues the questionnaire asked about the frequency of update of the model/methodology. Only few NRAs answered this question.

	ULL (copper)	FLLU	VULA-C	VULA-H	DA
three years	1	1	0	0	0
every market review	5	2	2	2	4
Other	2	2	1	2	2
three years	HR	HR			
every market review	EL FR HU IT NO	HU LI	HU IT	HU IT	HU IE IT LI
Other	BE DE	BE DK	IE	BE DK	DE ES

The majority of NRAs update prices and methodology in every market review, and in some cases there is also an annual adjustment for CPI (IE) or for civil infrastructure access products (CZ, IE). The process generally follows a public consultation.

Based on the past provisions of the NDCM Rec. and the new provisions of the Gigabit Recommendation, some relevant questions have been included to address other elements related to costing methodology that may have an impact on the outcome and can, in some way, be more controversial concerning the competitive outcome. Questions are: i) how coverage and take up are addressed for cost calculation and which technology is used for estimating the costs, (Rec. 50 and point 55 of the Gigabit Recommendation); ii) if and how reusable civil infrastructure is taken into account (Rec. 52-53 of the Gigabit Recommendation); iii) If prices of newly civil infrastructures are different from legacy one (Rec. 54 of the Gigabit Recommendation).

The NDCM Recommendation suggested to define costs based on an efficient NGA network, capable of delivering the DEA target[88] asking NRAs to address the issue of price stability with respect to the volume reduction due to the transition from the old to the new technology. A similar provision is included in the new Recommendation in relation to the transition to NGA and VHCN.

The take-up issue in the model refers to two other relevant points addressed explicitly in the new Gigabit recommendation:

- ✓ rec. 56 where the issue of the transition between legacy/VHCN should be considered to be consistent with a stability principle. This point is also related to how cost of services that are

88 The coverage at least of 30 Mbps to 100 % and take-up of the population at 50 % at 100 Mbps. Draft Gigabit Recommendation updates the take-up and coverage statement following the new “Gigabit target” in substitution of the “DEA target”, moreover the price stability issue is still relevant specifically in case an “anchor product” based partially or wholly on copper is still present and relevant for the market.

based on copper (ULL, SLU), or partially on copper (VULA-C), may be based on an architecture on which the services are effectively sold or, differently, based on the more efficient technology.

- ✓ the second point relates to the level of infrastructure competition that may be considered in the model itself (point 55).

The survey provided some interesting results. Three technologies, Copper (LLU), FTTC (VULA-C), FTTH (FLLU, VULA-H) are reported separately (they are reported in an aggregated way when the distinction between technologies is not relevant). This year's report also contains information on civil infrastructure access (duct).

In figure 38 the take up and coverage target are addressed according to three main questions: i) "What target coverage and take-up do you consider in your model?"; ii) How does service take-up affect your model between legacy and NGA/VHCN transition?; iii) 'How do you take into account demand/traffic on third party network (i.e. Mobile, cable)? (point 39 of NDCM Recommendation / point 55 of Gigabit Recommendation).

The first question is related to the target coverage and take-up as addressed by the Recommendations; the second question addresses the point how the transition from copper to NGA/VHCN is taken into account within the same model. The third question concerns infrastructure competition, i.e. how the traffic volumes that move on third party infrastructure are taken into account by NRAs.

The results are gathered is reported in the following table.

Figure 38 - NRAs information on target coverage/demand

Questions		Options	copper	FTTC	FTTH	DA
What target coverage and take-up do you consider in your model?	NDCM 2013	DEA (2020 digital Agenda For Europe)	3 (FR,HU,HR)	1 (HU)	1 (HU)	1 (HU)
		Gigabit connectivity target		1 (IT)	1 (IT)	1 (IT)
		Other	4 (CZ, LU, EE, RS)	2 (CZ, EE)	4 (BE, CZ, DK, EE)	1 (EE)
	Gigabit recommendation	Gigabit connectivity target				
		Other	1 (HR)	1 (HR)	1 (HR)	
How does service take-up affect your model?		Only volume on third party infrastructures affect the service take-up	1 (IT)	1 (IT)	1 (IT)	1 (IT)
		Economic depreciation are applied			2 (BE, DK)	1 (FR)
		Sunk cost are shared proportionally between services volume within a single infrastructure	3 (CZ, EL, HU)	3 (CZ, EL, HU)	3 (CZ, EL,HU)	2 (EL,HU)
		Other	3 (FR, LU, HR)	1 (HR)	1 (HR)	
How do you take into account demand/trafic that moves on third party network (i.e. Mobile, cable)? (point 39 of NDCM Recommendation/point 55 of Gigabit Recommendation)		only mobile is excluded	1 (FR)			
		only mobile and cable are excluded	1 (NO)			
		all traffic to other third party infrastructures is excluded	4 (EE, HR, HU, IT)	4 (EE, HR, HU, IT)	6 (BE, DK, EE, HR, HU, IT)	3 (EE, HU, IT)

	What target coverage and take-up do you consider in your model?	How does service take-up affect your model between legacy and NGA/VHCN transition?	How do you take into account demand/trafic that moves on third party network (i.e. Mobile, cable)? (point 39 of NDCM Recommendation/point 55 of Gigabit Recommendation)
BE (VULA-H)	Target coverage based on deployment plans SMP operator. Take-up based on take-up of an efficient operator, presence of other VHCN infrastructures (i.e. coax) and migration from copper to fiber		Only the demand over the modelled infrastructure is taken into account vula h
CZ (ULL, VULA-C, DF)	The model does not have any target coverage defined.		
DK (VULA-H)	With regards to coverage we're using the specific roll-out plans by the operators. Take-up is harmonized for all 3 modelled operators		
FR (ULL)	Use FTTH model	BULRIC+ Model : this model neutralizes the effects of copper network drainage. There are a depreciation in the civil engineering value (asset life : 50 years for duct)	
HR (ULL, VULA-C, VULA-H, FLLU)	In our BU-LRIC+ cost model for fibre network we consider coverage based on SMP operator real coverage plans (in BU-LRIC+ model is implemented methodological principle that modelled operator fibre network is similar to SMP's fibre network). On the other hand, demand for services over fibre network of modelled operator is calculated on the basis of assumption that take up rate in 2027 will be 43%.	Input in our BU-LRIC+ model is demand of copper based and fibre based retail and wholesale services. The demand is calculated on the basis of real coverage of both copper and fibre network provided by SMP operator, while demand for services over both networks is calculated on the basis of assumed take up rate of fibre network in 2027. Take rate means percentage of active fibre lines (retail or wholesale) over number of covered premises. Projection of take up rate is based on assumptions that some of the current copper lines will be migrated to the modelled fibre network, but also to the VHCN networks of alternative network operators. Because of that costs of modelled fibre network are shared between retail and whole services, but due to existence of alternative VHCN's and consequently lower take up rate of the modelled fibre network the costs are distributed on lower number of lines causing higher unitary costs of modelled fibre networks. On the other hand, taking into account that majority of civil engineering infrastructure is shared between copper and fibre networks, significant amount of costs are shared between modelled copper and fibre networks and VHCN's of alternative operators which are deployed on SMP's civil engineering infrastructure.	When modelling demand of modelled fibre network in the future we assume that some of the existing copper users will miggrate to the modelled fibre network, but also to other alternative infrastructure e.g. VHCNs of alternative operators, including also possible 5G solutions. Also it should be taken into account that in Croatia we have relatively significant number of end users who have already migrated from the copper network to fixed solution over mobile networks and which are expected to partially migrate to fixed VHCN's in the future.
HU (ULL, VULA-C, VULA-H, DA)			When calculating costs using LRIC method, it is necessary to identify only those fixed and variable costs that would not be incurred if the group of services were no longer provided to third-party operators and retail subscribers. The avoidable costs of the group of services increment may be calculated by identifying the total long-run cost of an operator providing its full range of services and then identifying the long-run costs of the same operator in the absence of the group of services being provided to third parties retail subscribers. This may then be subtracted from the total long-run costs of the business to derive the defined increment.
IT (ULL, VULA-C, VULA-H, DA)	The model consider for all services a VHCN FTTH national network and for estimating the cost of each service the architecture is adapted for estimating copper based services. If higher cost is found the most efficient technology is used for estimating the price	There is only one network so the efficient cost is shared by the same whole number of active lines for all services. This means that the take up rate of copper/NGA/VHCN doesn't affect the corresponding cost, but only the whole number of active lines	In the national situation the infrastructure competition is emerging from an alternative operator that is buidling own network independetly without using the civil infrastructure of the incumbent operator that are not wide spread and accessible, moreover new civil infrastructures of the SMP are very recent. In this perspective in line with provision a neutral make or buy singnal can be achieved taking into account that volumes on third party infrastructures (FWA and FTTH) are excluded to evaluate unitary cost.
LI (FLLU, DA)	100% ftth		
NO (ULL)			Only copper and fibre demand are included in the model
RS (ULL,DA)	actual coverage of SMP operator		

Source: BEREC RA Database 2024

To better figure out how the three main issues previously addressed are in practice taken into account the following information has been collected: i) type of architecture considered for estimating costs of the services; ii) the main coverage considered in the model to understand if national in scope or not; iii) if this coverage is related to the SMP and/or OAO target; iv) If the price is a national average or not; v) if the price calculated takes into account the state aid received.

Figure 39 - NRAs information main implementation issue

Questions	Options	copper	FTTC	FTTH	DA
Architecture considered for cost calculation of the service	FTTH	4 (DE, FR, HR, RS)	2 (HR, IT)	5 (BE, DK, HR, IT, LI)	3 (DE, IT, RS)
	FTTE-FTTC-FTTH	2(CY, HU)	2 (CY, HU)	2 (CY, HU)	1 (HU)
	FTTH-FTTC	1 (EL)	1 (EL)	1 (EL)	1 (EL)
	FTTE-FTTC		1 (IE)		
	FTTE	2 (BE, IT)			
	Other	1 (EE)	1 (EE)	1 (EE)	1 (EE)
Main coverage	National	13 (BE, CY, DE, EE, EL, FR, HR, HU, IT, NO, PL, RS, SI)	6 (CY, EE, EL, HR, HU, IT)	8 (CY, EE, EL, HR, HU, IT, LI, PL)	11 (DE, EE, EL, ES, HU, IE, IT, LI, PL, RS, SI)
	Sub national			2 (BE, DK)	
	Other				
Coverage NGA (FTTC/FTTH) Target Time	Forward Looking	8 (CY, DE, EL, FR, HR, HU, NO, PL)	5 (CY, EL, HR, HU, IT)	9 (BE, CY, DK, EL, HR, HU, IT, LI, PL)	5 (DE, EL, HU, IT, LI)
	As is	3 (EE, IT, RS)	1 (EE)	1 (EE)	2 (EE, RS)
	Other				
Coverage (NGA (FTTC/FTTH))	SMP coverage	9 (BE, CY, EE, EL, HR, NO, PL,RS, SI)	3 (CY, EE, HR)	5 (BE, CY, EE, HR, PL)	4 (EE, PL, RS, SI)
	OAO coverage				EL
	SMP+OAO coverage	1 (DE)	1 (EL)	1 (EL)	1 (DE)
	National	2 (FR, HU)	2 (HU, IT)	3 (HU, IT, LI)	3 (HU, IT, LI)
	Sub national				
	Other				
Cost calculation	National average	12 (BE, CY, DE, EE, EL, FR, HR, HU, IT, NO, RS, SI)	6 (CY, EE, EL, HR, HU, IT)	7 (CY, EE, EL, HR, HU, IT, LI)	9 (DE, EE, EL,,ES, HU, IT, LI, RS, SI)
	Target areas where regulation is in charge	1 (PL)		3 (BE, DK, PL)	1 (PL)
	Other				
Do you take into account state aid plans in your model?	Yes we exclude target areas that is financed	2 (EL, HR)	1 (EL)	1 (EL)	
	Yes we exclude contribution received	2 (DE, NO)		1 (DK)	1 (DE)
	Other				
	No	4 (BE, EE, HU, IT)	3 (EE, HU, IT)	5 (BE, EE, HU, IT, LI)	4 (EE, HU, IT,LI)

Source: BEREC RA Database 2024

From the previous replies we understand that NRAs take care of the stability issue and generally the provision of the Recommendations are well addressed with the scope to warrant final price stability.

NRAs that apply the Recommendation address the issue of the target coverage and take-up in defining a national coverage model with a forward-looking perspective. The costs are estimated mainly at national level. For copper based services the costs are estimated more frequently using an (efficient) FTTH network instead of a copper-based one. The modelling approach is consistent independently from the product in question such as copper, NGA VHCN and civil infrastructure.

With respect to the issue of traffic volumes on third party infrastructure most NRAs do not include the part of the demand on third party networks in combination with a national coverage in the costing methodology.

NRAs generally do not take into account State aid received by the incumbent operator, although this is not conclusive as some NRAs exclude the target areas from the calculation (EL, HR[89]) or the contribution received (DE, DK); this usually happens in countries where State aid plans are very limited.

The second main issue addressed by the Commission Recommendation, which is also relevant in the new Gigabit Recommendation, is how reusable civil infrastructure is taken into account in the

[89] HR on this issue declared that "since modelled fibre network is similar to SMP's fibre network the NRA excluded expected subsidies from the calculation of capex costs. Also, for state aided areas we considered higher take up rate since in these areas is not expected more than one VHCN network".

model. In the following table a resume of the replies provided by the NRAs are reported. Almost all NRAs that apply the Commission Recommendation take into account reusable civil infrastructure for cost calculation when relevant. No differences are detected in the approach between different product market, meaning that already depreciated asset are treated in the same way for estimating costs, where relevant, for copper, NGA and VHCN services. CEI, both underground and poles, can be considered reusable; in some countries only underground civil infrastructure (duct and manhole) is considered reusable (BE, IT, RS). Some respondents (4) consider only legacy copper infrastructures reusable (BE, CZ, HU, IT), when others consider both legacy copper infrastructures and new VHCN infrastructures as a reusable asset (EE, EL, FR, HR, IE, LI[90],LU, NO). Few NRAs also consider copper cables to be a reusable asset. In that case an economic lifetime of the infrastructure is considered longer than the general book value.

A question on duct access, namely pricing differences between old and new infrastructure in line with Rec. 59 of the Gigabit Recommendation reveals that only one NRA applies different prices for old and newly build duct access infrastructure.

Figure 40 - NRA information on civil infrastructure

Question	Options	Replies
Do you take into account reusable civil infrastructure?	Yes	18 (CY,CZ,DE,DK,EE,EL,ES,FR,HR,HU,IE,IT,LU,NO,PL,RS,SI,SK)
Which infrastructure do you consider to be reusable?	Only legacy copper infrastructures	4 (BE, CZ, HU, IT)
	Both legacy copper infrastructures and new VHCN infrastructures	8 (EE, EL, FR, HR, IE, LI, LU, NO)
	Comment received on which elements are taken into account when considering reusable civil infrastructure?	(IT) Agcom considers that the asset-valuation method reflects the fact that reusable legacy civil-engineering infrastructure assets in general cannot be replicated in the competitive process. In that sense, only duct legacy trench has been effectively considered reusable and RAB has been excluded as already depreciated. For Poles assets even if not explicitly considered reusable due to the fact that activities and investments should be done to host more than one OAO, the asset life has been considered equal to 40 years instead of lower value generally accepted (20 years) for such kind of asset, with the objective to contributing to the intention of reusability purpose in the final price; (FR, HR, HU, LI, NO) All ducts, manhole, Poles are considered reusable; (IE) For ducts the infrastructure is considered reusable depending on the rates of incidence remediation activities per kilometre (e.g. number of blockage clearances per kilometre); We have looked at data from the SMP operator regarding their actual deployment and investment in its FTTH network. We consider that all those routes where the SMP operator has deployed FTTH can be classified as Reusable, where we take the top down valuation recorded in the SMP operators accounts. BE, RS only ducts have been considered reusable.
Which method do you use to consider already-depreciated infrastructures?	The depreciated asset are no longer included in the RAB and estimated at book value using accounting data from the SMP operator (CZ,DE,ES,EE,FR,HR,IE,NO,SK); Indexation method (EL, HU, SI); The amount of already depreciated asset is obtained as the product between the amount of civil infrastructures that can be considered reusable	

[90] This is valid only for VHCN services, in other case only legacy infrastructures are considered relevant for copper LLU.

	with respect to the BU-LRAIC estimation, with the percentage of asset life already depreciated, in line with point 54 of the new Gigabit recommendation reusable legacy civil-engineering assets and their corresponding RAB have been evaluated on the basis of current costs adjusted for depreciation over the lifetime of the assets, that means that already depreciated assed have been excluded from the RAB. (IT).	
What percentage of underground civil infrastructure do you consider to be reusable with respect to all underground civil infrastructures included in the RAB model?	<10% (BE);<20% (IT);<50% (HR);<80% (LU); CZ<90%, >90% (DK, FR, EE, HU, LI, RS)	
Average asset life already depreciated of the underground civil infrastructure that you consider reusable	<20 (CZ); <=30 (EE, ES); <=40 (IT, LU); HU (>40)	
Asset life of all other underground civil infrastructure	<30 (EE); <=40 (CZ, EL, IT, LU, SE); >40 (FR, HU, SK)	
Do you consider copper cable reusable?	Yes	5 (CZ, EE, NO, SI, SK)
Asset life of copper cable (number of years)	20 (EE, SI); 36 (CZ); 50 (NO buried cable economic life time 50 year - 12-25 regulatory lifetime)	
Do you differentiate prices for new and old infrastructure (reply for Duct access product)?	1 (DE)	

Source: BEREC RA Database 2024

3.6 Cost model technical implementation

In line with past editions of the regulatory accounting report some information on technical cost model implementation by NRAs are reported in the following table. The replies are reported without differentiating between single product market, as is the case for reusable civil infrastructure. No differences are observed when the replies by NRAs are provided for more than one product/market.

Figure 45 summarises the main approaches by NRAs to implement cost models. The replies reported are independent of the specific price control and costing methodology adopted by each NRAs and refer to the implementation of the models that support the price control and costing methodologies.

As a general question NRAs were required to provide information on the asset base of the model used; most replies consider a Bottom-up basis as a main instrument; a scorched node or modified scorched node[91] approach is generally applied by most of the NRAs; the local central office /ODF area covered is also the main approach to start the design project of the network. For FTTH a GPON solution is the most frequent architecture to calculate the cost of services.

[91] 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 the survey some other elements have also been addressed *inter alia* one question on the treatment of the inflation rate inside the model implementation. Point 61 of the Commission Notice on WACC: *"Investors maximise their inflation-adjusted or real returns. There are typically two ways in which NRAs take inflation into account: a) inflation is compensated for through the annual indexation of the company's assets and only a real WACC return is allowed; or b) inflation expectations are included in the return on capital, by using a nominal WACC, without any adjustment to the company's asset base."* The replies received are not extensive and both options (a and b) included in the Commission Notice on WACC are considered by NRAs without a specific "more frequent" approach.

Figure 41 – General network modelling approach

Questions	Options	Replies
Asset Base	BU (Bottom up)	14 (BE,CY,CZ,DE,DK,EL,ES,FR,HR,HU,IT,LU, NO, RS)
	TD (Top down)	4 (EE,LI,PL,SI)
	Hybrid	1(IE)
Model main assumption[92]	Scorched node	6 (BE,CY,HR,HU,IT,SI)
	Scorched earth	1(PL)
	Modified Scorched node	7 (DE,DK,EL,FR,IE,LU,NO)
	Other	1 (EE)
Model geographical unit	MDF/ODF area	11 (BE,CY,EL,FR,HU,IE,IT,LU,NO,RS,SE)
	Municipality	
	Municipality/MDF-ODF area	2 (DE,PL)
	Other	2 (HR,EE)
Architecture FTTH	GPON/P2P	4 (CZ,FR,EE,LU)
	GPON	7 (CY,EL,ES,HR,HU,IT,RS)
	P2P	1(DE)
	Other	0
How do you include the asset price development?	Already in the nominal WACC (point 61-b Commission WACC notice)	3 (IT,LI,SI)
	Explicitly in the asset base in combination of real WACC (point 61 -a Commission WACC notice)	2 (FR,HU)
	Allowing direct adjustment of inflation on the final price (ex. Price*(1+Allowed IR))	1(LU)
	Other	3 (CZ,BE[93], DK)
Number of Local central office/point of interconnection considered		600 (BE); 7542 (CZ), 8187 (FR); 348 (HR) 4000 (IT); 35 (LI);100 (LU); 6400 MDF/200 ODF (RS); 3122 (SE)
Cost per meter (digging) new civil infrastructure (average value)		985 CZK/m - 42 Euro/m (CZ); 40-50 Euro/m (FR); 67,85 Euro/m (HR); 37

[92] The information reported is independent from the main price control method (such as Cost orientation/Price cap/ERT) declared by NRAs in each market.
[93] BE:Asset prices evolution is taken into account through price trends.

	(VHCN)- 42(copper) Euro/m (IT); 10 Euro/m (RS); 595 SEK/m- 54,3 Euro/m (SE)
Cost per meter (pole) new civil infrastructure (average value)	**11-13 Euro/m (FR); 1,05 Euro/m (HR);6.3 Euro/m (IT);**
What percentage (%) is the poles length trace included in your model with respect to the whole trace length: (length of pole trace)/(total trace length)?	**<10% (CZ); <40% (FR);<40%-45% (HR);<50%(IT)<10%(SE)**
Do the SMP plans of copper network switch-off have an impact on the model?	**3 Yes (BE, DK, EE) BE (Demand is impacted by migration from copper); EE (As copper usage volume decrease, the copper price per unit increase)**

In the following Figure legacy ULL services and adopted costing methodology is shown. The reported price bands[94] have been evaluated considering a compound inflation rate from 2014 until 2023 (HIPC) for each country.[95] The other tables show replies provided by NRAs for all other products/markets.

[94] The price band refer to the one reported in rec. 41 of the NDCM Recommendation in Euro currency.

[95] https://ec.europa.eu/eurostat/databrowser/view/tec00118/default/table?lang=en. The compound inflation rate is considering the time window 2014 -2023. 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*(1+inflation rate_2014)*(1+inflation rate_2015)*...*(1+inflation rate_2023).

Figure 42 – LLU monthly fee and costing methodology/ price band

	Regulated product	Price control main cathegory	Allocation method main cathegory	Allocation method sub cathegory	cost base	Annualization method	Equivalence model	Margin squeeze test	price declared	Price band low	Price band High	Inflation (2014-2023)
BE	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	ex-post MS test	8.73 Euro/month	10.19	12.73	1.27
CY	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Straight-line (linear depreciation)	EOO	ERT (Economic Replicability Test)	8.7 Euro/month	9.00	11.25	1.12
CZ	Yes	Others/Combination	N/A	N/A	N/A	N/A	EOI	ex - ante MS test	€ 6,98 / 175 CZK /month	11.92	14.90	1.49
DE	Yes	Cost_Orientation	LR_A_IC	TD-LR(A)IC+	CCA	Annuity	N/A	ex - ante MS test	N/A	10.23	12.79	1.28
EE	Yes	Cost_Orientation	FDC	N/A	HCA	Straight-line (linear depreciation)	EOO	N/A	4.93 Euro/month	12.04	15.05	1.51
EL	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	ERT (Economic Replicability Test)	7.92 Euro/month	9.04	11.29	1.13
ES	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Economic depreciation	EOI	N/A	8.6	9.51	11.89	1.19
FI	Yes	Cost_Orientation	FDC	N/A	CCA	Straight-line (linear depreciation)	N/A	N/A	N/A	9.59	11.99	1.20
FR	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	N/A	9,20€/access/month (excluding network taxes)	9.71	12.14	1.21
HR	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	ex - ante MS test	5.63 Euro/month	10.16	12.70	1.27
HU	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Tilted annuity	EOO	N/A	1610 HUF/month	12.85	16.07	1.61
IT	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Annuity	EOI	ex - ante MS test	9.91 Euro/month	9.69	12.11	1.21
LT	Yes	Cost_Orientation	FDC	N/A	HCA	RAV (Regulatory Asset Value)	N/A	ex-post MS test	2.8 Euro/month	11.90	14.88	1.49
LU	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Tilted annuity	N/A	N/A	N/A	9.83	12.29	1.23
NO	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	HCA	Economic depreciation	EOO	N/A	98 NOK/mont	10.96	13.70	1.37
PL	Yes	Cost_Orientation	LR_A_IC	TD-LR(A)IC+	CCA	Tilted annuity	EOO	N/A	N/A	11.41	14.26	1.43
RS	Yes	Cost_Orientation	FDC	N/A	CCA	Straight-line (linear depreciation)	EOO	N/A	5,35 Euro/month	11.98	14.97	1.50
SI	Yes	Others/Combination	LRIC	BU-LRIC	CCA	Tilted annuity	EOI	N/A	5.46 Euro/month	9.98	12.47	1.25
SK	Yes	Others/Combination	N/A	N/A	N/A	N/A	EOI	ERT (Economic Replicability Test)	4.2 Euro/month	11.05	13.82	1.38

Figure 43 – SLU monthly fee and costing methodology

	Regulated product	Price control main cathegory	Allocation method main cathegory	Allocation method sub cathegory	cost base	Annualization method	Equivalence model	Margin squeeze test	price declared
CY	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Straight-line (linear depreciation)	EOO	ERT (Economic Replicability Test)	5.45 Euro/month
CZ	Yes	Others/Combination	N/A	N/A	N/A	N/A	EOI	ex - ante MS test	€ 1,04 / 26 CZK/month
DE	Yes	Cost_Orientation	LR_A_IC	TD-LR(A)IC+	CCA	Annuity	N/A	ex - ante MS test	N/A
EL	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	ERT (Economic Replicability Test)	3.99 Euro/month
ES	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Economic depreciation	EOI	N/A	N/A
FI	Yes	Cost_Orientation	N/A	N/A	CCA	Straight-line (linear depreciation)	N/A	N/A	N/A
FR	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	N/A	9,20€/access/month (excluding network taxes)
HU	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Tilted annuity	EOO	N/A	979 HUF/month
IT	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Annuity	EOI	ex - ante MS test	5.89 Euro/month
LT	Yes	Cost_Orientation	FDC	N/A	HCA	RAV (Regulatory Asset Value)	N/A	ex-post MS test	2 Euro/month
LU	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Tilted annuity	N/A	N/A	N/A
NO	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	HCA	Economic depreciation	EOO	N/A	80 NOK/month
PL	Yes	Cost_Orientation	LR_A_IC	TD-LR(A)IC+	CCA	Tilted annuity	EOO	N/A	N/A

Figure 44 – FLLU monthly fee and costing methodology

	Regulated product	Price control main cathegory	Allocation method main cathegory	Allocation method sub cathegory	cost base	Annualization method	Equivalence model	Margin squeeze test	price declared
BE	Yes	Others/Combination	LR_A_IC	BU-LR(A)IC+	CCA	Economic depreciation	EOO	ex-post MS test	No price decision as of today
CZ	Yes	Others/Combination	N/A	N/A	N/A	N/A	EOI	ex - ante MS test	€ 62,37 / 1 564 CZK
DK	Yes	No price control/Price Flexibility	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EE	Yes	Cost_Orientation	FDC	N/A	HCA	Straight-line (linear depreciation)	EOO	N/A	60
FI	Yes	Cost_Orientation	FDC	N/A	CCA	Straight-line (linear depreciation)	N/A	N/A	Prices for FTTH: DNA 13,50 eur/mo, Elisa 16,00 eur/mo, Telia 27,50 eur/mo Prices for FTTB: DNA 87,50 eur/mo, Elisa 82,00 eur/mo, Telia 84,50 eur/mo
HR	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	ex - ante MS test	N/A
HU	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Tilted annuity	EOO	N/A	1379 HUF/month from the ODF;
IT	Yes	No price control/Price Flexibility	N/A	N/A	N/A	N/A	Other	N/A	N/A
LI	Yes	Cost_Orientation	FDC	N/A	HCA	Straight-line (linear depreciation)	Other	N/A	fibre LLU: CHF 21.95 per month
LT	Yes	Cost_Orientation	FDC	N/A	HCA	RAV (Regulatory Asset Value)	N/A	ex-post MS test	4.5 Euro/month
LU	Yes	Others/Combination	N/A	N/A	N/A	N/A	EOI	ERT (Economic Replicability Test)	N/A
LV	Yes	Others/Combination	FDC	N/A	CCA	Straight-line (linear depreciation)	N/A	N/A	2.99 EUR par 100 metres
NO	Yes	No price control/Price Flexibility	N/A	N/A	N/A	N/A	EOO	N/A	262 NOK /month
PL	Yes	Cost_Orientation	LR_A_IC	TD-LR(A)IC+	CCA	Tilted annuity	EOO	N/A	N/A
PT	Yes	No price control/Price Flexibility	N/A	N/A	N/A	N/A	EOI	N/A	10.078 Euro/month
SE	Yes	No price control/Price Flexibility	N/A	N/A	N/A	N/A	EOI	ERT (Economic Replicability Test)	N/A
SI	Yes	Retail_minus	N/A	N/A	N/A	N/A	EOI	ERT (Economic Replicability Test)	N/A
SK	Yes	Others/Combination	N/A	N/A	N/A	N/A	EOI	ERT (Economic Replicability Test)	N/A

Figure 45 – VULA-C monthly fee and costing methodology

	Regulated product	Price control main cathegory	Allocation method main cathegory	Allocation method sub cathegory	cost base	Annualization method	Equivalence model	Margin squeeze test	price declared
BE	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	N/A	EOO	ex-post MS test	N/A
CY	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Straight-line (linear depreciation)	EOI	ERT (Economic Replicability Test)	8.24
CZ	Yes	Others/Combination	N/A	N/A	N/A	N/A	EOI	ex - ante MS test	€ 7,94 / 199 CZK
DE	Yes	Cost_Orientation	LR_A_IC	TD-LR(A)IC+	CCA	N/A	N/A	ex - ante MS test	N/A
EE	Yes	Cost_Orientation	FDC	N/A	HCA	Straight-line (linear depreciation)	EOO	ex-post MS test	7 - 29 € month per connection (depending on speed, from download 2 Mbps to 1000 Mbps) + 0,40 € Mbps monthly maximum volume fee in transmission network, look at: https://www.telia.ee/images/documents/sideettevotjale/lairibaressursiteenus_3_0.pdf
EL	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	ERT (Economic Replicability Test)	8.01-10.23 Euro/month
FI	Yes	Cost_Orientation	N/A	N/A	CCA	Straight-line (linear depreciation)	N/A	N/A	N/A
HR	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	ex - ante MS test	N/A
HU	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Tilted annuity	EOO	N/A	4iG L2WAP: FTTC VDSL 30 MBit/s 2035 HUF/month w/o TV; 2556HUF/month w 3 TV channel Magyar Telekom L2WAP: FTTC VDSL 30 MBit/s 2202 HUF/month w/o TV; 3441 HUF/month w 3 HD TV channel (and 0 SD channel)
IE	Yes	Cost_Orientation	LR_A_IC	N/A	CCA	Economic depreciation	N/A	N/A	€20 since 1 July 2025
IT	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Annuity	EOO	ex - ante MS test	13.07 Euro/month all profiles
SI	Yes	Retail_minus	N/A	N/A	N/A	N/A	EOI	ERT (Economic Replicability Test)	N/A
SK	Yes	Others/Combination	N/A	N/A	N/A	N/A	EOI	ERT (Economic Replicability Test)	8.2

Figure 46 – VULA-H monthly fee and costing methodology

	Regulated product	Price control main cathegory	Allocation method main cathegory	Allocation method sub cathegory	cost base	Annualization method	Equivalence model	Margin squeeze test	price declared
BE	Yes	Others/Combination	LR_A_IC	BU-LR(A)IC+	CCA	Economic depreciation	EOO	ex-post MS test	From 19 € to 44 € according to line profile
CY	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Straight-line (linear depreciation)	EOI	ERT (Economic Replicability Test)	8.24
CZ	Yes	Others/Combination	N/A	N/A	N/A	N/A	EOI	ex - ante MS test	€ 7,94 / 199 CZK
DE	Yes	No price control/Price Flexibility	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EE	Yes	Cost_Orientation	FDC	N/A	HCA	Straight-line (linear depreciation)	EOO	ex-post MS test	7 - 29 € month per connection (depending on speed, from download 2 Mbps to 1000 Mbps) + 0,40 € Mbps monthly maximum volume fee in transmission network, look at: https://www.telia.ee/images/documents/sidettevotjale/lairibaressursiteenus_3_0.pdf
EL	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	ERT (Economic Replicability Test)	8.58-18.54 Euro/month +2.45 Floor box Euro/month
ES	Yes	Retail_minus	LRIC	BU-LRIC	CCA	Economic depreciation	EOI	ERT (Economic Replicability Test)	16.68
FI	Yes	Cost_Orientation	N/A	N/A	CCA	Straight-line (linear depreciation)	N/A	N/A	N/A
HR	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	ex - ante MS test	N/A
HU	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Tilted annuity	EOO	N/A	4iG L2WAP: FTTH 500 MBit/s 2299 HUF/month w/o TV; 3300 HUF/month w 3 TV channel Magyar Telekom L2WAP: FTTH 150 MBit/s 2555 HUF/month w/o TV; 3794 HUF/month w 3 HD TV channel (and 0 SD channel)
IE	Yes	Others/Combination	N/A	N/A	N/A	N/A	N/A	ex - ante MS test	€23.50 is the lowest monthly rental charge for the incumbent's FTTP VUA 500MBPS service. Faster speed services are available at higher prices.
IT	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Annuity	EOI	ex - ante MS test	GPON:14.24 Euro/month (all profiles) XGSPON: 16.60 Euro/month (all profiles)
LU	Yes	Others/Combination	N/A	N/A	N/A	N/A	EOI	ERT (Economic Replicability Test)	N/A
LV	Yes	Others/Combination	FDC	N/A	CCA	Straight-line (linear depreciation)	N/A	N/A	5.50 EUR
MT	Yes	Retail_minus	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NO	Yes	Others/Combination	N/A	N/A	N/A	Straight-line (linear depreciation)	EOO	ERT (Economic Replicability Test)	N/A
SI	Yes	Retail_minus	N/A	N/A	N/A	N/A	EOI	ERT (Economic Replicability Test)	N/A
SK	Yes	Others/Combination	N/A	N/A	N/A	N/A	EOI	ERT (Economic Replicability Test)	8.2

Figure 47 – Duct-access monthly fee and costing methodology

	Regulated product	Price control main cathegory	Allocation method main cathegory	Allocation method sub cathegory	cost base	Annualization method	Equivalence model	Margin squeeze test	price declared
BE	Yes	Others/Combination	LR_A_IC	BU-LR(A)IC+	CCA	N/A	EOO	N/A	Proposed tariffs by SMP operator are in the range of 0,14 -2,72 €/meter, not approved by the BIPT
BG	Yes	Cost_Orientation	FDC	N/A	CCA	N/A	N/A	N/A	The market is found competitive
DE	Yes	Cost_Orientation	LR_A_IC	TD-LR(A)IC+	CCA	Annuity	N/A	ex - ante MS test	N/A
EE	Yes	Cost_Orientation	FDC	N/A	HCA	Straight-line (linear depreciation)	EOO	N/A	0,049 € per meter per cable site
EL	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	N/A	N/A
ES	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Economic depreciation	EOO	N/A	N/A
FR	Yes	Cost_Orientation	FDC	N/A	CCA	Tilted annuity	EOI	N/A	Non-mutualised deployments: 0,057€/cm2*m/month Mutualised deployments: 1,054/premise to pass/month
HR	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	N/A	63-110 mm EUR/m/year 1,377; 50 mm EUR/m/year 1,1733; 20-40 mm EUR/m/year 0,3942; 3-16 mm (micro ducts) EUR/m/year 0,2243
HU	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Tilted annuity	EOO	N/A	21028 HUF/km/month
IE	Yes	Cost_Orientation	LR_A_IC	N/A	CCA	Straight-line (linear depreciation)	N/A	N/A	0.047-0.042(self install) Euro/meter/month (2024) 0.042-0.038(self install) Euro/meter/month (2028) and annual decrease year by year Duct prices are charged on a per metre basis where the rental price is based on an access seeker using a minimum cross-sectional area in the Duct, equivalent to a 25mm sub-duct. An increase in usage, meaning the use of larger or additional Sub Ducts that exceed this minimum cross-sectional area, will result in an equivalent percentage increase in the Duct charge. (https://drive.usercontent.google.com/download?id=1o-zIm034GEk2yE3AuP5PAq27Sq9ObINP&export=download)
IT	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Annuity	EOI	N/A	Price for miniduct 12mm of diameter (price converted from IRU fee over 15 years): -until 2 miniducts: 0.066 Euro/month/m -until 3 miniducts: 0.053 Euro/month/m -until 4 miniducts: 0.045 Euro/month/m ->= 5 miniducts: 0.039 Euro/month/m
LI	Yes	Cost_Orientation	FDC	N/A	HCA	Straight-line (linear depreciation)	N/A	N/A	0.107 CHF per month per metre in access segment; 0.128 CHF per month per metre in backhaul segment
LT	Yes	Cost_Orientation	FDC	N/A	HCA	RAV (Regulatory Asset Value)	N/A	ex-post MS test	27 Eur /1 km
LV	Yes	Cost_Orientation	FDC	N/A	CCA	Straight-line (linear depreciation)	N/A	N/A	36,44 EUR per initial 100 m; 4,28 EUR per every next 100 m.
NO	Yes	Cost_Orientation	FDC	N/A	HCA	N/A	EOO	N/A	N/A
PL	Yes	Cost_Orientation	LR_A_IC	TD-LR(A)IC+	CCA	Tilted annuity	EOO	N/A	N/A
PT	Yes	Cost_Orientation	N/A	N/A	N/A	N/A	EOI	N/A	Ducts (occupation for main ducts): 6.37€/km/cm2 - Lisboa and Porto municipalities 4.88€/km/cm2 - other municipalities
RS	Yes	Cost_Orientation	FDC	N/A	CCA	Straight-line (linear depreciation)	EOO	N/A	1) The monthly charge for the lease of the space in cable ducts for laying cables in pipes with the diameter up to 20mm is 0,081 eur/m. 2) The monthly charge for the lease of the space in cable ducts for laying cables in pipes with the diameter up to 40mm is 0,09 eur/m.
SI	Yes	Others/Combination	LRIC	BU-LRIC	CCA	Tilted annuity	EOI	N/A	72,09 EUR/km
SK	Yes	Cost_Orientation	LRIC	BU-LRIC	N/A	N/A	Other	N/A	N/A

Figure 48 – Pole fee and costing methodology

	Regulated product	Price control main cathegory	Allocation method main cathegory	Allocation method sub cathegory	cost base	Annualization method	Equivalence model	Margin squeeze test	price declared
BG	Yes	Cost_Orientation	FDC	N/A	CCA	N/A	N/A	N/A	The market is found competitive
DE	Yes	Cost_Orientation	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EL	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ES	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Economic depreciation	EOO	N/A	N/A
FR	Yes	Cost_Orientation	FDC	N/A	CCA	Tilted annuity	EOI	N/A	Non-mutualised deployments: 0,057€/cm2*m/month Mutualised deployments: 1,054/premise to pass/month
HU	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Tilted annuity	EOO	N/A	82 HUF/piece/month
IE	Yes	Cost_Orientation	LR_A_IC	N/A	CCA	Straight-line (linear depreciation)	N/A	N/A	1.77 euro/mont/pole (2024) 2.05 Euro/month/pole (2028) See Schedule 102 in the price list linked below: https://drive.usercontent.google.com/download?id=1o-zIm034GEk2yE3AuP5PAq27Sq9ObINP&export=download
IT	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Annuity	EOI	N/A	Price for miniduct 12 mm of diameter on Poles (price converted from IRU fee over 15 years): 0.039 Euro/month/m
LV	Yes	Cost_Orientation	FDC	N/A	CCA	Straight-line (linear depreciation)	N/A	N/A	18,45 EUR per initial 6 poles; 1,00 EUR per every next pole.
NO	Yes	Cost_Orientation	FDC	N/A	HCA	N/A	EOO	N/A	N/A
PL	Yes	Cost_Orientation	LR_A_IC	TD-LR(A)IC+	CCA	Tilted annuity	EOO	N/A	N/A
PT	Yes	Cost_Orientation	N/A	N/A	N/A	N/A	EOI	N/A	Poles (pole occupation, per cable fixation): 1.00 €

Figure 49 – DF and costing methodology

	Regulated product	Price control main cathegory	Allocation method main cathegory	Allocation method sub cathegory	cost base	Annualization method	Equivalence model	Margin squeeze test	price declared
AT	Yes	Cost_Orientation	FDC	N/A	CCA	Straight-line (linear depreciation)	EOO	N/A	Charge in built-up areas: €0.174 per metre per month, Charge in undeveloped areas: €0.094 per metre per month Active minus: Price of a 1 Gbit/s Etherlink Service minus €407.69 per month for the active equipent
CZ	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Tilted annuity	EOI	N/A	€ 0,07 - € 0,15 / 1,81 CZK - 3,71 CZK
DE	Yes	Cost_Orientation	LR_A_IC	TD-LR(A)IC+	CCA	Annuity	N/A	ex - ante MS test	N/A
EL	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	N/A	N/A
FR	Yes	Others/Combination	N/A	N/A	N/A	N/A	EOO	N/A	From 0,50/m/year to 1,80/m/year, depending on the location of the fiber and the number of lines
HU	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Tilted annuity	EOO	N/A	2150 HUF/km/month
IE	Yes	Cost_Orientation	LR_A_IC	N/A	CCA	Tilted annuity	N/A	N/A	N/A
IT	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Annuity	EOI	N/A	Primary section=17.83 Euro/month; Secondary section= 12.70 Euro/month (price converted from IRU fee over 15 years)
LI	Yes	Cost_Orientation	FDC	N/A	HCA	Straight-line (linear depreciation)	N/A	N/A	backhaul fibre: CHF 0.04 per month per metre
LT	Yes	Cost_Orientation	FDC	N/A	HCA	RAV (Regulatory Asset Value)	N/A	ex-post MS test	9 Euro/month
PL	Yes	Cost_Orientation	LR_A_IC	TD-LR(A)IC+	CCA	Tilted annuity	EOO	N/A	N/A
PT	Yes	Cost_Orientation	N/A	N/A	N/A	N/A	EOO	N/A	N/A
RS	Yes	Cost_Orientation	FDC	N/A	CCA	Straight-line (linear depreciation)	EOO	N/A	Monthly rental fee for optical fiber without transmission equipment (dark fiber) in the local network: 1) for a pair of optical fibers 25,60 RSD/m (0,22 eur/m) 2) for one optical fiber 15,36 RSD/m (0,13 eur/m)
SI	Yes	Others/Combination	LRIC	BU-LRIC	CCA	Tilted annuity	EOI	N/A	N/A

Figure 50 – BTS legacy fee and costing methodology

	Regulated product	Price control main cathegory	Allocation method main cathegory	Allocation method sub cathegory	cost base	Annualization method	Equivalence model	Margin squeeze test	price declared
BE	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	ex-post MS test	13.66
DE	Yes	Cost_Orientation	LR_A_IC	TD-LR(A)IC+	CCA	Annuity	N/A	ex - ante MS test	N/A
EE	Yes	Cost_Orientation	FDC	N/A	HCA	Straight-line (linear depreciation)	EOO	ex-post MS test	7 - 29 € month per connection (depending on speed, from download 2 Mbps to 1000 Mbps) + 0,83 € Mbps monthly maximum volume fee in transmission network, look at: https://www.telia.ee/images/documents/sideettevotjale/lairibaressursiteenus_3_0.pdf
EL	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	ERT (Economic Replicability Test)	N/A
ES	Yes	Retail_minus	LRIC	BU-LRIC	CCA	N/A	EOI	ERT (Economic Replicability Test)	N/A
FI	Yes	No price control/Price Flexibility	N/A	N/A	N/A	N/A	N/A	N/A	N/A
FR	Yes	Cost_Orientation	N/A	N/A	CCA	Tilted annuity	EOO	N/A	Price is mainly composed of access component and collect component . 1 / Acces component: from 13,08€/month to 13,83€/month (excluding network taxes) 2/ Backhaul component: price depends on the backhaul technology and the class of service. For Ethernet, component is 2.70 / month + [0.60 - 2.15]/Mbits
HR	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	N/A	N/A	N/A	N/A	N/A
HU	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Tilted annuity	EOO	N/A	Shared Lines on copper network: 1195 HUF/month (30 Mbit/s downstream net speed); Naked Lines on copper network : 2666 HUF/month (30 Mbit/s downstream net speed)
LT	Yes	Cost_Orientation	FDC	N/A	HCA	RAV (Regulatory Asset Value)	N/A	ex - ante MS test	Prices vary from 7.90 Eur/month to 30 Eur/month depends on speed, quality, other parameters. More details in the link below.
LU	Yes	Others/Combination	N/A	N/A	N/A	N/A	EOI	ERT (Economic Replicability Test)	N/A
NO	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	HCA	Tilted annuity	EOO	N/A	From 292 NOK to 533 NOK
PL	Yes	Cost_Orientation	LR_A_IC	TD-LR(A)IC+	CCA	Tilted annuity	EOO	N/A	N/A
RS	Yes	Cost_Orientation	FDC	N/A	CCA	Straight-line (linear depreciation)	EOO	N/A	367 RSD (3,13 eur) for the xDSL access and 450 RSD (3,84eur) per Mb/s for traffic delivery
SI	Yes	Others/Combination	LRIC	BU-LRIC	CCA	Tilted annuity	EOI	N/A	N/A

Figure 51 – BTS_fttc fee and costing methodology

	Regulated product	Price control main cathegory	Allocation method main cathegory	Allocation method sub cathegory	cost base	Annualization method	Equivalence model	Margin squeeze test	price declared
BE	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	ex-post MS test	15.4
DE	Yes	Cost_Orientation	LR_A_IC	TD-LR(A)IC+	CCA	Annuity	N/A	ex - ante MS test	N/A
EE	Yes	Cost_Orientation	FDC	N/A	HCA	Straight-line (linear depreciation)	EOO	ex-post MS test	7 - 29 € month per connection (depending on speed, from download 2 Mbps to 1000 Mbps) + 0,83 € Mbps monthly maximum volume fee in transmission network, look at: https://www.telia.ee/images/documents/sideettevotjale/lairibaressursiteenus_3_0.pdf
EL	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	ERT (Economic Replicability Test)	N/A
FI	Yes	No price control/Price Flexibility	N/A	N/A	N/A	N/A	N/A	N/A	N/A
HR	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	N/A	N/A	N/A	N/A	N/A
HU	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Tilted annuity	EOO	N/A	Shared Lines on FTTC/XDSL: 1848 HUF/month (50 Mbit/s downstream net speed); Naked Lines on FTTC/XDSL : 2687 HUF/month (50 Mbit/s downstream net speed)
LU	Yes	Others/Combination	N/A	N/A	N/A	N/A	EOI	ERT (Economic Replicability Test)	N/A
PL	Yes	Cost_Orientation	LR_A_IC	TD-LR(A)IC+	CCA	Tilted annuity	EOO	N/A	N/A
RS	Yes	Cost_Orientation	FDC	N/A	CCA	Straight-line (linear depreciation)	EOO	N/A	N/A
SI	Yes	Retail_minus	N/A	N/A	N/A	N/A	EOI	ERT (Economic Replicability Test)	N/A
SK	Yes	Others/Combination	N/A	N/A	N/A	N/A	EOI	ERT (Economic Replicability Test)	N/A

Figure 52 – BTS_ftth fee and costing methodology

	Regulated product	Price control main cathegory	Allocation method main cathegory	Allocation method sub cathegory	cost base	Annualization method	Equivalence model	Margin squeeze test	price declared
BE	Yes	Others/Combination	LR_A_IC	BU-LR(A)IC+	CCA	Economic depreciation	EOO	ex-post MS test	From 19 € to 44 € according to line profile
DE	Yes	No price control/Price Flexibility	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DK	Yes	No price control/Price Flexibility	N/A	N/A	N/A	N/A	N/A	A price squeeze test is an element in the commitments. The test is carried out by the operator	Fibia (POI2): 209 DKK + Mediaconverter Norlys (POI2): 233 DKK Bornfiber (POI2): 209 DKK + Mediaconverter AURA (POI2): 207 DKK Nef(POI1): 165 DKK
EE	Yes	Cost_Orientation	FDC	N/A	HCA	Straight-line (linear depreciation)	EOO	ex-post MS test	7 - 29 € month per connection (depending on speed, from download 2 Mbps to 1000 Mbps) + 0,83 € Mbps monthly maximum volume fee in transmission network, look at: https://www.telia.ee/images/documents/sideettevotjale/lairibaressursiteenus_3_0.pdf
EL	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	ERT (Economic Replicability Test)	N/A
ES	Yes	Retail_minus	LRIC	BU-LRIC	N/A	Economic depreciation	EOI	ERT (Economic Replicability Test)	16.68
FI	Yes	No price control/Price Flexibility	N/A	N/A	N/A	N/A	N/A	N/A	N/A
HR	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	N/A	N/A	N/A	N/A	N/A
HU	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Tilted annuity	EOO	N/A	3171 HUF/month (100 Mbit/s downstream net speed)
LT	Yes	Cost_Orientation	FDC	N/A	HCA	RAV (Regulatory Asset Value)	N/A	ex - ante MS test	Prices vary from 7.90 Eur/month to 30 Eur/month depends on speed. More details in the link provided.
LU	Yes	Others/Combination	N/A	N/A	N/A	N/A	EOI	ERT (Economic Replicability Test)	N/A
LV	Yes	Others/Combination	FDC	N/A	CCA	Straight-line (linear depreciation)	N/A	N/A	5.50 EUR plus mothly fee for respective service class.
PL	Yes	Cost_Orientation	LR_A_IC	TD-LR(A)IC+	CCA	Tilted annuity	EOO	ERT (Economic Replicability Test)	N/A
PT	Yes	No price control/Price Flexibility	N/A	N/A	N/A	N/A	EOO	N/A	Aggregate Access Prices (Monthly): Internal aggregate access: 1 Gbps - € 500 10 Gbps - € 1900 External aggregate access: 1 Gbps - € 700 10 Gbps - € 3000 Price per local access (Monthly): € 14
RS	Yes	Cost_Orientation	FDC	N/A	CCA	Straight-line (linear depreciation)	EOO	N/A	N/A
SI	Yes	Retail_minus	N/A	N/A	N/A	N/A	N/A	ERT (Economic Replicability Test)	N/A
SK	Yes	Others/Combination	N/A	N/A	N/A	N/A	EOI	ERT (Economic Replicability Test)	N/A

Figure 53 – LL_legacy and costing methodology

	Regulated product	Price control main cathegory	Allocation method main cathegory	Allocation method sub cathegory	cost base	Annualization method	Equivalence model	Margin squeeze test	price declared
BE	Yes	Others/Combination	LR_A_IC	BU-LR(A)IC+	CCA	N/A	EOO	ex-post MS test	N/A
CY	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Straight-line (linear depreciation)	EOO	N/A	N/A
DE	Yes	Cost_Orientation	LR_A_IC	TD-LR(A)IC+	CCA	N/A	N/A	ex - ante MS test	N/A
EL	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	N/A	N/A
ES	Yes	Cost_Orientation	N/A	N/A	CCA	Economic depreciation	EOI	N/A	N/A
FR	Yes	Cost_Orientation	FDC	N/A	CCA	Tilted annuity	EOO	N/A	N/A
IE	Yes	Cost_Orientation	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LT	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SI	Yes	Others/Combination	LRIC	N/A	CCA	Tilted annuity	EOI	N/A	N/A

Figure 54 – LL_NGA and costing methodology

	Regulated product	Price control main cathegory	Allocation method main cathegory	Allocation method sub cathegory	cost base	Annualization method	Equivalence model	Margin squeeze test	price declared
AT	Yes	Cost_Orientation	FDC	N/A	HCA	Straight-line (linear depreciation)	N/A	ex - ante MS test	N/A
BE	Yes	Others/Combination	LR_A_IC	BU-LR(A)IC+	CCA	N/A	EOO	ex-post MS test	N/A
CY	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Straight-line (linear depreciation)	EOO	N/A	N/A
DE	Yes	Cost_Orientation	LR_A_IC	TD-LR(A)IC+	CCA	N/A	N/A	ex - ante MS test	N/A
EL	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Tilted annuity	EOO	N/A	N/A
ES	Yes	N/A	N/A	N/A	N/A	N/A	EOI	ex-post MS test	N/A
FR	Yes	Others/Combination	N/A	N/A	N/A	N/A	Other	ex - ante MS test	N/A
HR	Yes	Cost_Orientation	LR_A_IC	N/A	CCA	Tilted annuity	EOO	N/A	N/A
HU	Yes	Cost_Orientation	FDC	HCA-FDC	HCA	Straight-line (linear depreciation)	EOO	N/A	N/A
IE	Yes	Cost_Orientation	FDC	N/A	CCA	Tilted annuity	N/A	N/A	N/A
IT	Yes	Cost_Orientation	LR_A_IC	BU-LR(A)IC+	CCA	Annuity	EOO	N/A	N/A
LT	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LU	Yes	Cost_Orientation	LRIC	BU-LRIC	CCA	Tilted annuity	Other	N/A	N/A
PT	Yes	Cost_Orientation	N/A	N/A	N/A	N/A	EOO	N/A	N/A
SI	Yes	Others/Combination	LRIC	N/A	CCA	Tilted annuity	EOI	N/A	N/A

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 approach towards price regulation. 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 29 NRAs[96] have provided data for this section. If data is confidential and can therefore not be shown in the analysis or if there are country specificities, this will be shown in the footnotes. Only data for countries who have responded to the survey will be shown.

The following structural data have been collected (data as at 1st April 2024 unless otherwise indicated in the footnotes):

[96] 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), Latvia (LV), Malta (MT), Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Romania (RO), Republic of Serbia (RS), Sweden (SE), Slovenia (SI), Slovakia (SK). No data has been provided in 2024 by: Albania (AL), Iceland (IS), Luxemburg (LU), Montenegro (ME), North Macedonia (MK), Kosovo (XK)* and Turkey (TR). Bosnia and Herzegovina (BA) and Ukraine (UA) may be included in future reports, as soon as data becomes available. *All references to Kosovo in this document should be understood to be in the context of the United Nations Security Council Resolution 1244 (1999).

Table 4 - Structural Data collected

1	**Population and population density**
1.1	Number of inhabitants
1.1a	Number of private households
1.1b	Households per population (calculated)
1.2	Population density (number of inhabitants per sqkm)
1.2a	Metro population density
1.2b	Non-metro population density
2	**Market situation**
2.1	Mobile broadband penetration (subscriptions as % of the total population)
2.2	Fixed broadband penetration (subscriptions as a % of total households)
2.2.1	Technology share: % of DSL
2.2.2	Technology share: % of VDSL (NGA)
2.2.3	Technology share: % of cable (coax, HFC)
2.2.4	Technology share: % of FTTx
2.2.5	Technology share: % of other technologies (i.e. satellite, BWA etc.)
3	**Market share SMP operator / competitors**
3.1	Share of fixed broadband subscriptions
3.1.1	SMP operator
3.1.2	Competitors
3.1.3	Cable operators
3.2	Share of DSL broadband subscriptions legacy broadband
3.2.1	SMP operator
3.2.2	Competitors
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) vertically 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) vertically 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)

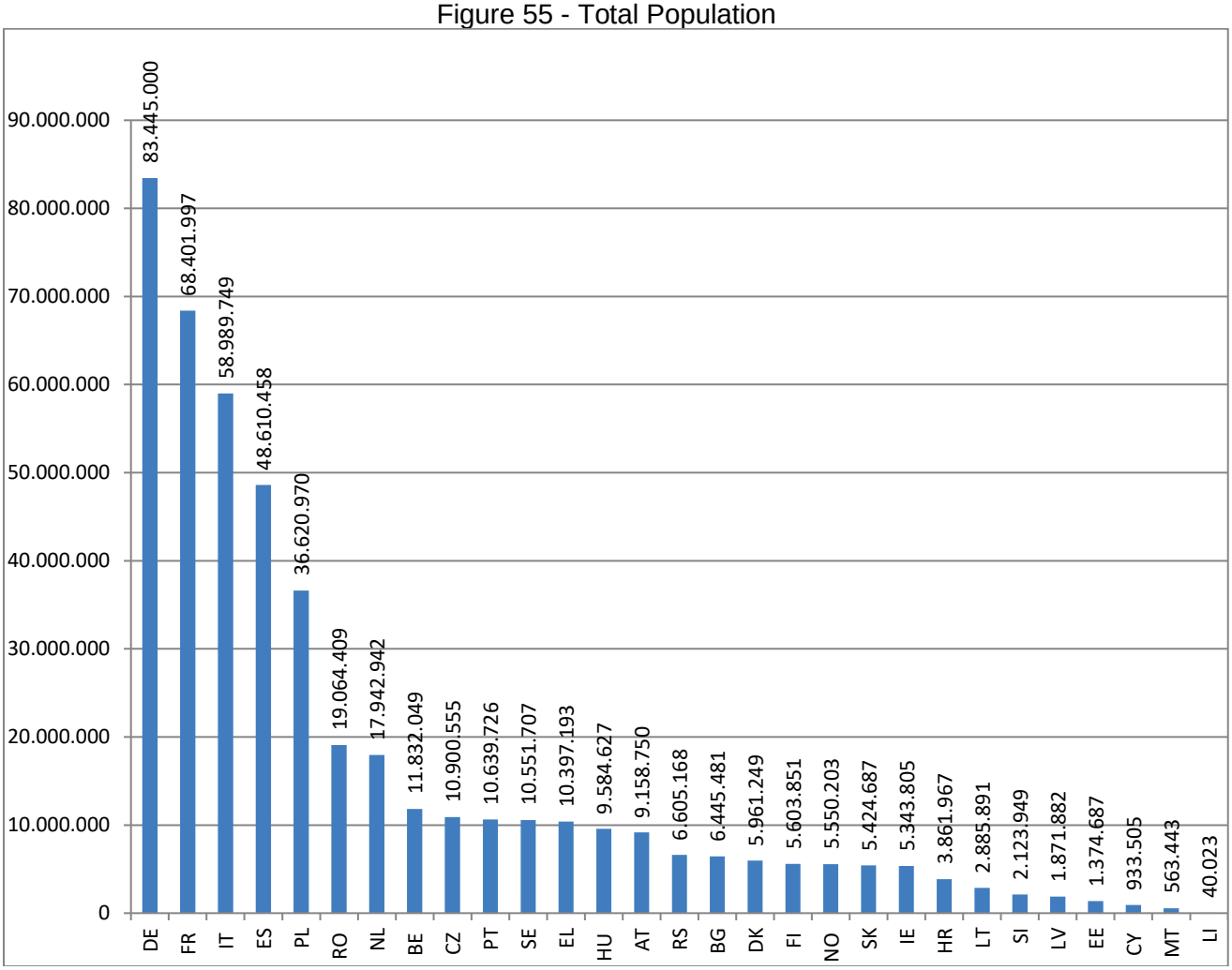
The data for population and population density is sourced from the latest available Eurostat data. The data for Market and Competitive Situation and Market Shares is sourced from participating NRAs.

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***[97] (i. e. the total number of inhabitants per country) the top countries remain Germany, France, Italy, Spain and Poland.

Figure 55 - Total Population

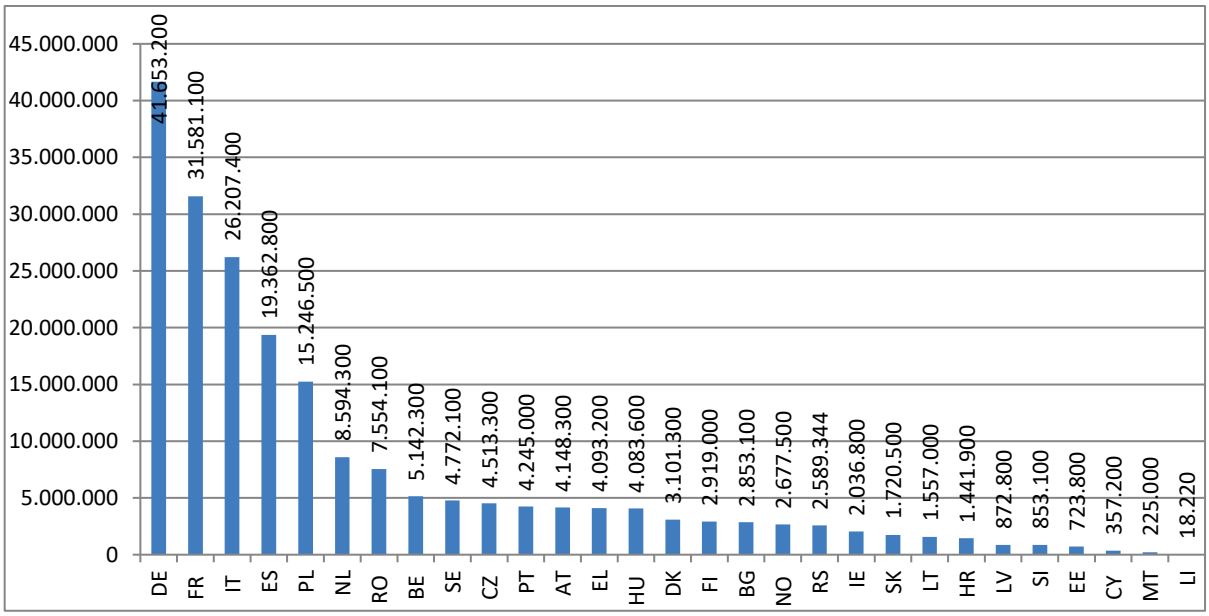


Source: Eurostat 2024

[97] Eurostat "Population on 1st January 2024" online data code: TPS00001. Provisional data for BE, ES, FR, IT, CY, LI. Provisional/estimate for DE, EL, estimate for RO.

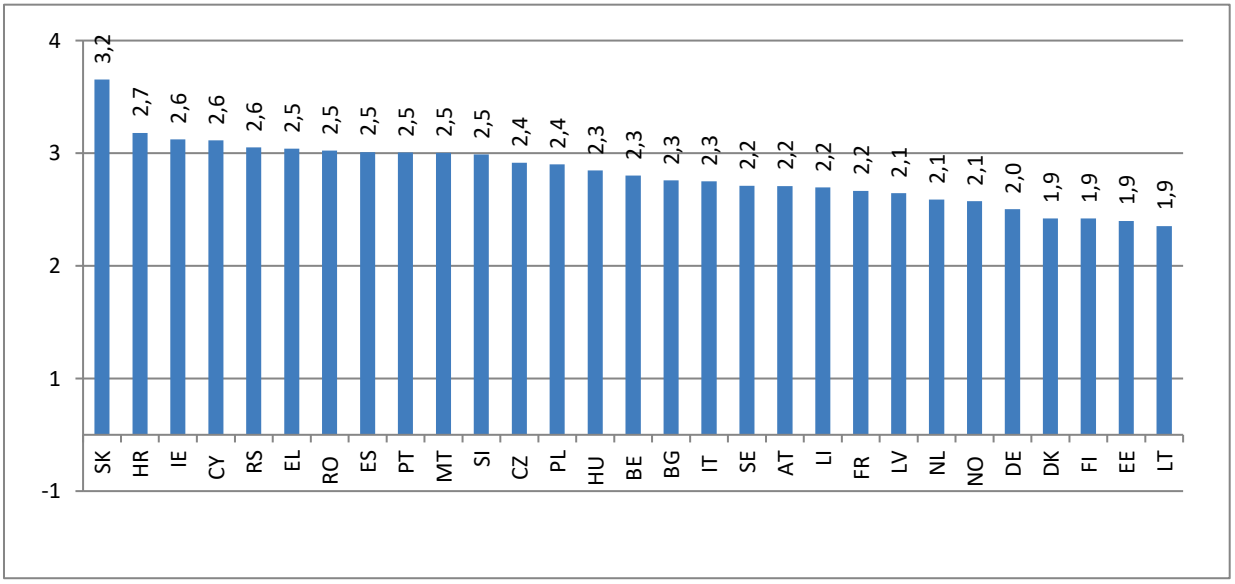
On average, there are between two to three people per household in most countries, a little over three in Slovakia[98]. The number of households is used in this report to calculate the fixed broadband penetration, shown per household.

Figure 56 – Number of Private Households



Source: Eurostat 2024

Figure 57 - Number of People per Private Household

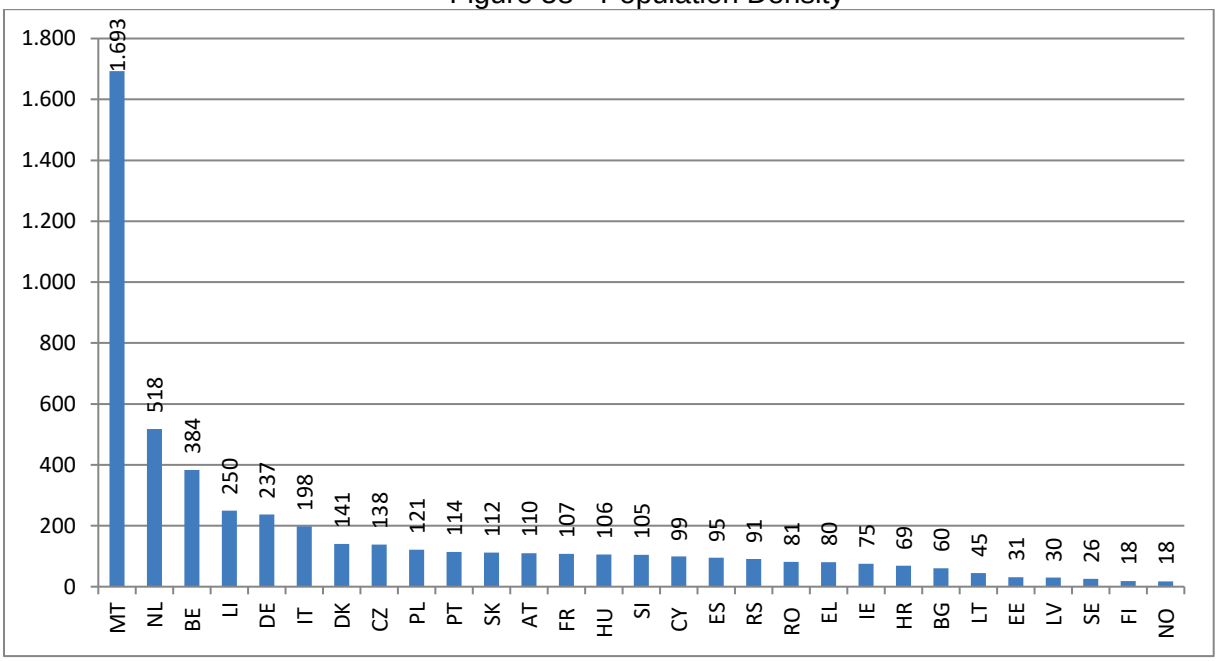


Source: Eurostat 2024

[98] Eurostat 2024 "number of private households", online data code: LFST_HHNHWHTC. Number of people per household calculated from number of households. Household definition differs (see Eurostat Metadata) in FR, ES. HR: Discrepancies to last year's data may be due to a break in time series.LI: current best estimate, RS: Census 2022 data (Statistical Office of the Republic of Serbia).

In terms of ***population density***[99] (i. e. the number of inhabitants per square kilometre) the top countries with around/above 200 people per square km are Malta, the Netherlands, Belgium, Liechtenstein, Germany and Italy.

Figure 58 - Population Density

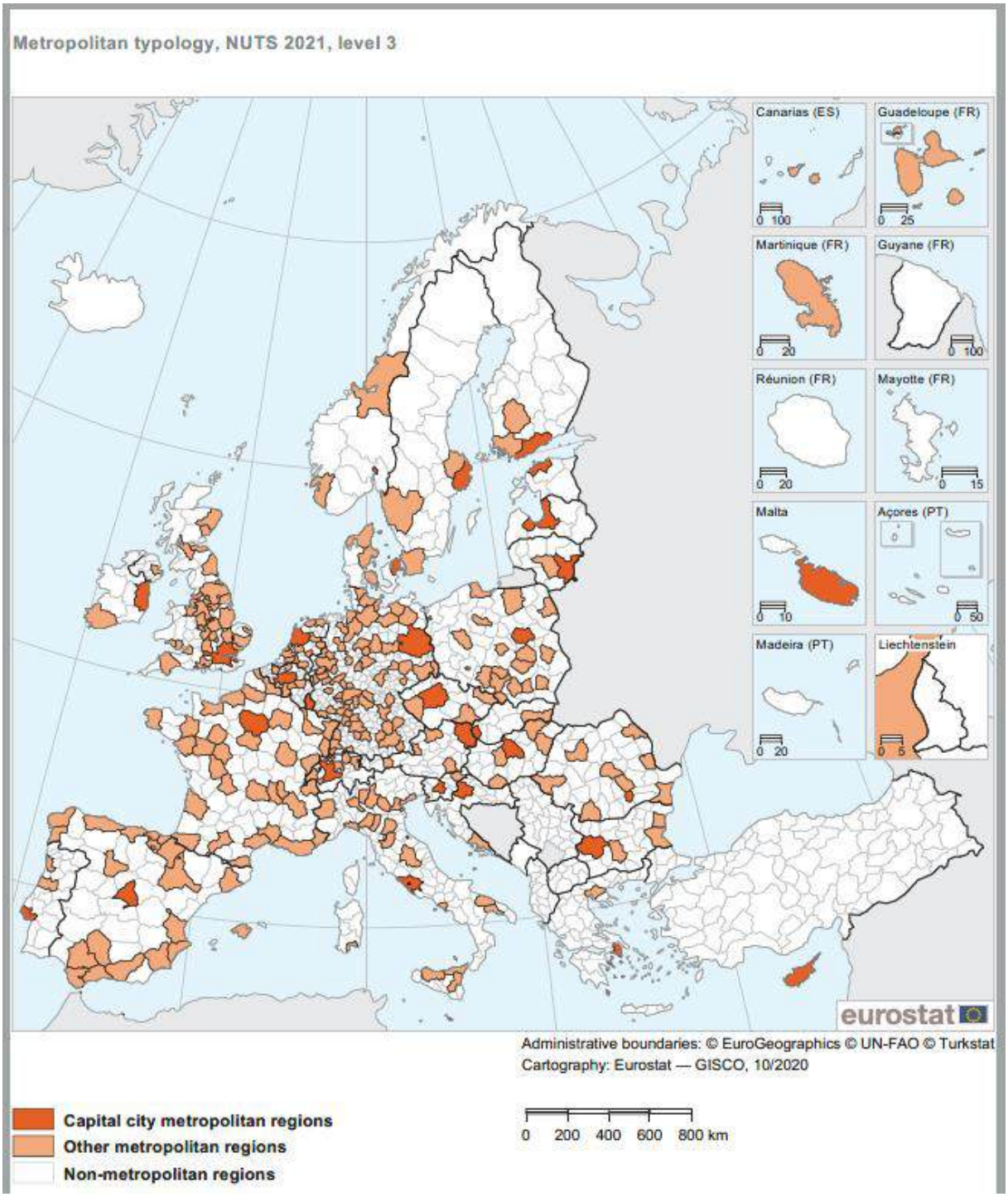


Source: Eurostat 2024

When looking at the ***metro and non-metro population density,*** an impression is given of the differences in country typology, i.e. a country with highly densely populated urban areas (in many smaller countries one single densely populated urban area) might well have very sparsely populated rural areas. This requires different effort and cost by operators to provide infrastructure access to the population in urban and rural areas and leaves regulators with the challenge of encouraging high capacity broadband roll-out also in less densely populated areas.

[99] Eurostat 2024 "Population density" online data code: TPS00003. Provisional in FR, PT, estimate in DE, RO. Discrepancies to last year's data may be due to a break in time series: PT, BG, HU, PL. RS: Eurostat 2019 data.

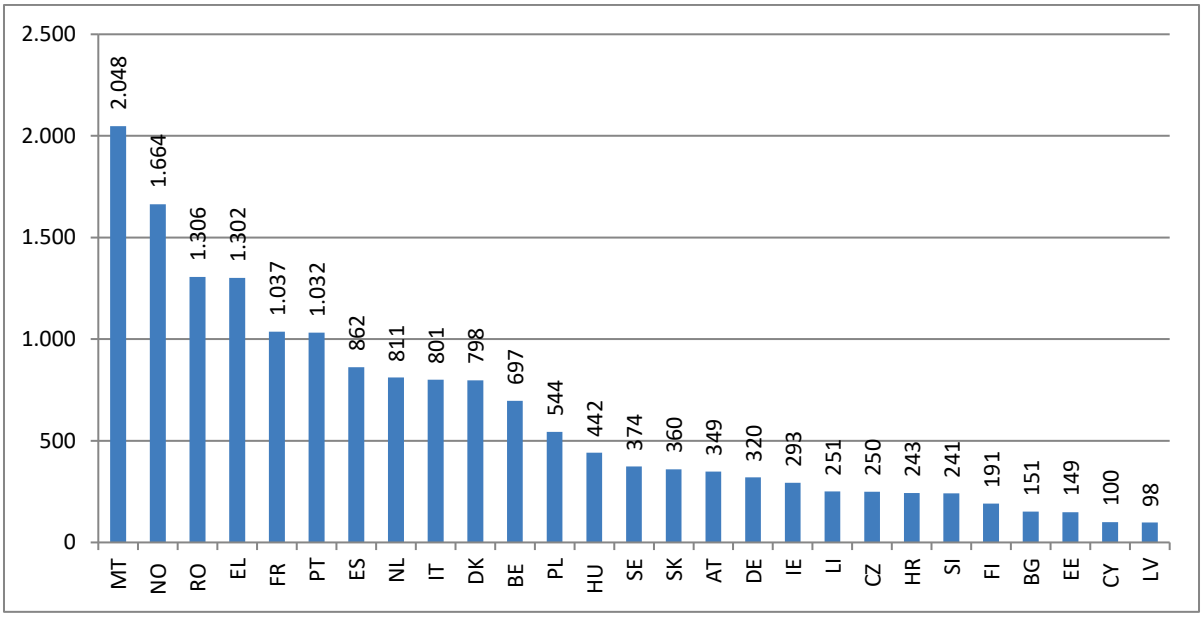
Figure 59 - Metro and Non-metro Regions in the EU/EFTA



Source: Eurostat, JRC and European Commission, Directorate-General Regional and Urban Policy. Based on population grid from 2011 and NUTS 2021.

The population density in the capital city metro area[100] (usually, but not always, the most densely populated area of the country) is highest in Valetta (MT), Oslo (NO), Bucharest (RO), Athens (EL), Paris (FR) and Lisbon (PT).

Figure 60 - Metro Population Density



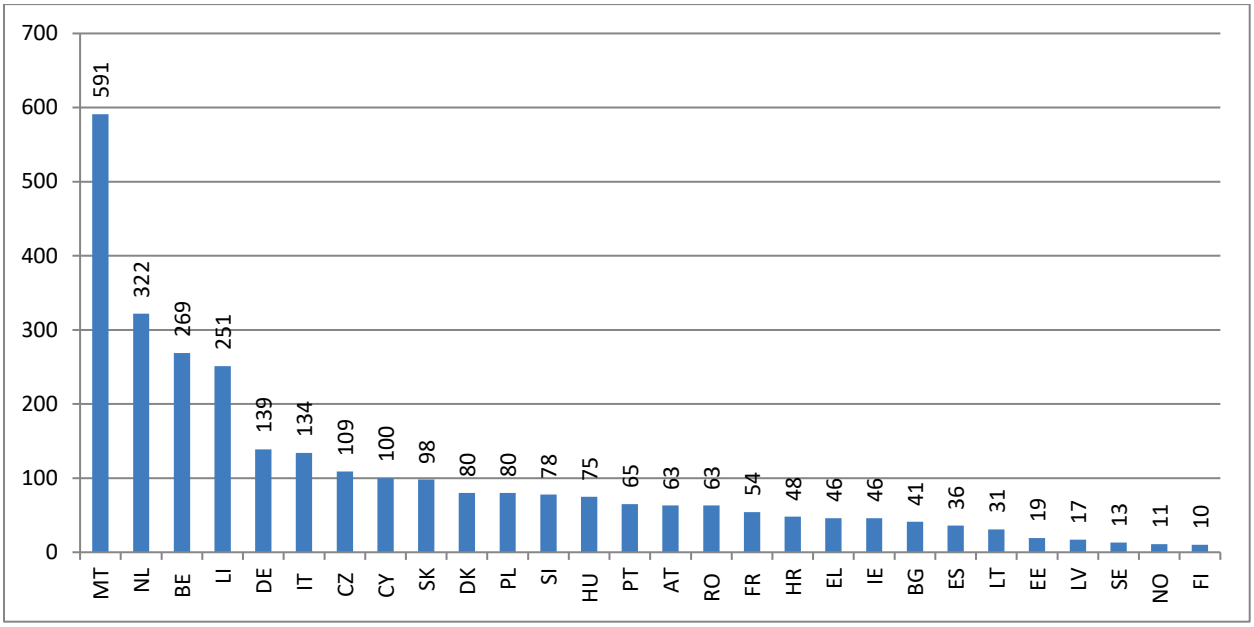
Source: Eurostat 2024

The non-metro population density[101] shows Scandinavian and Baltic countries (FI, NO, SE, LV, EE, LT) to have the least densely populated rural areas.

[100] Eurostat 2024 "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: Zagreb, HU: Budapest, IE: Dublin, IT: Rome, LI: Vaduz, LV: Riga, MT: Valetta, NL: Amsterdam, NO: Oslo, PL: Warsaw, PT: Lisbon, RO: Bucharest, RS: no data, SE: Stockholm, SI: Ljubljana, SK: Bratislava. Provisional in FR, estimate in RO. Discrepancies to last year's data may be due to a break in time series: PL, HU, BG. Not available for RS. No differentiation Metro/Non Metro area in CY, LI.

[101] Provisional in FR, estimate in RO. Discrepancies to last year's data may be due to a break in time series in PL, HU, BG. Not available for RS. No differentiation Metro/Non Metro area in CY, LI.

Figure 61 - Non-Metro Population Density



Source: Eurostat 2024

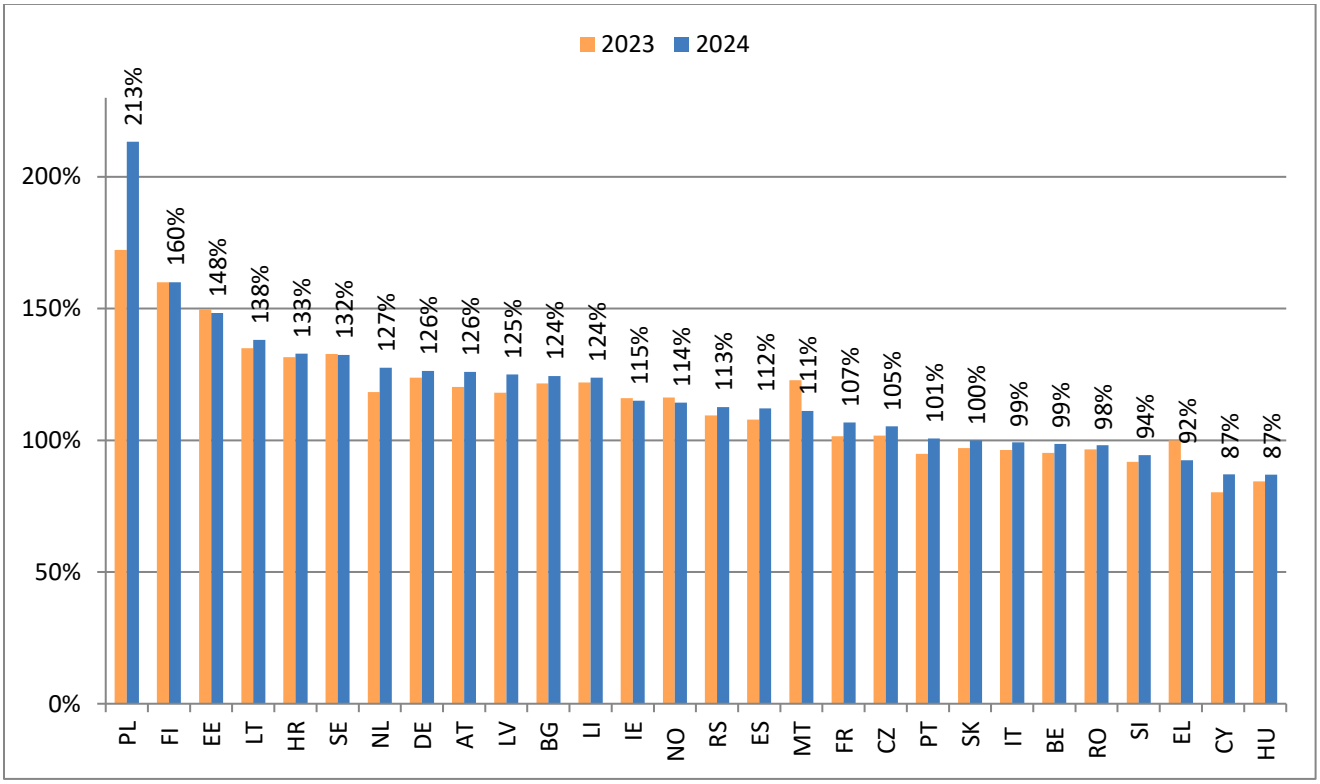
4.3 Market and Competitive Situation

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[102]. Where data is confidential or not available, it will not be shown in the graphs (see explanations in foot notes).

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.

The ***mobile broadband penetration***, represents mobile broadband end users as a percentage of the total population,[103] (excluding M2M). Percentages range between 87 per cent in Hungary to 213 per cent in Poland. In 2024 all but two of the respondents have a mobile broadband penetration rate of more than 90 per cent. Shown in comparison is the penetration rate in 2023.

Figure 62 - Mobile Broadband Penetration (per total population)



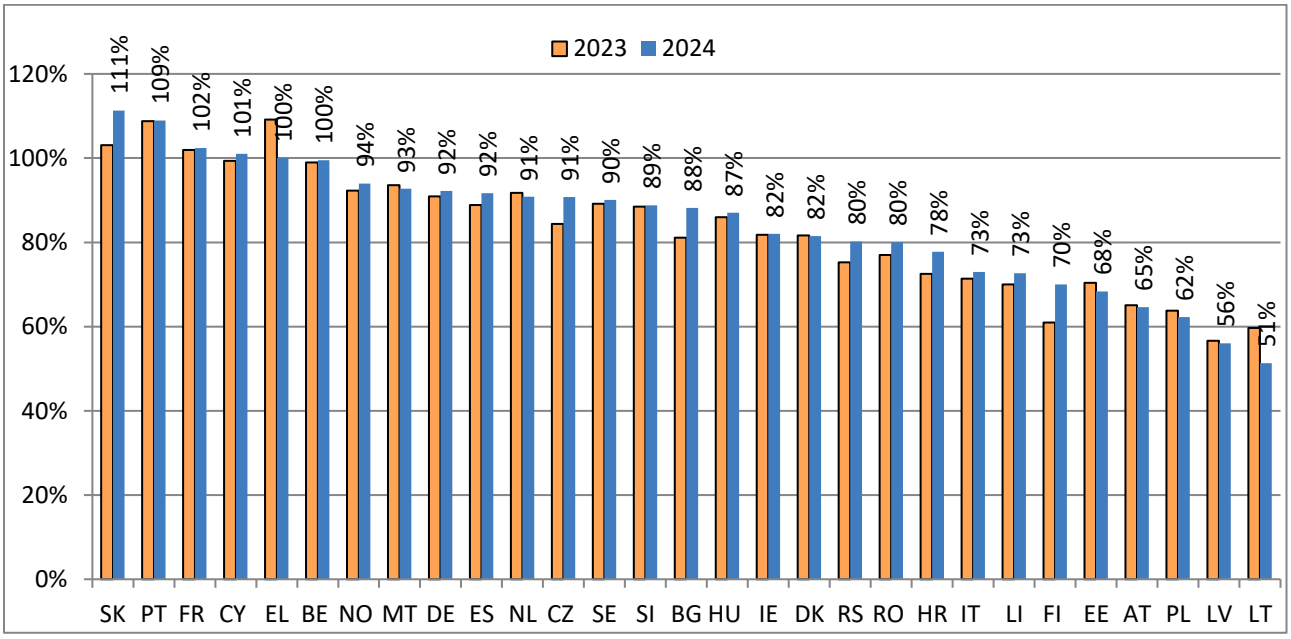
Source: BEREC RA database 2024

[102] CZ: The separation of former incumbent – O2 Czech Republic a.s. (O2), former SMP operator, was performed on June 1, 2015. On the basis of voluntary separation of O2, two companies were created – O2 and Česká telekomunikační infrastruktura a.s. (CETIN). CETIN (currently SMP in market 1, market 3b has been deregulated) became infrastructure and wholesale service operator (provider) without any retail activities, and O2 became retail service operator (provider), i.e. operator O2 represents the incumbent at the retail level and infrastructure owner is CETIN, represents the incumbent/SMP operator at the wholesale level.

[103] AT: 2023 value was estimated too high and was adjusted. DK: data not available (5G only router subscriptions). HU: no data provided: ITU value used instead.

The *fixed broadband penetration*[104] represents fixed broadband subscriptions as a percentage of the total number of households. Percentages vary between 51 per cent in Lithuania and 111 per cent in Slovakia. Percentages are shown in comparison to the previous year 2023.

Figure 63 - Fixed Broadband Penetration (per household)



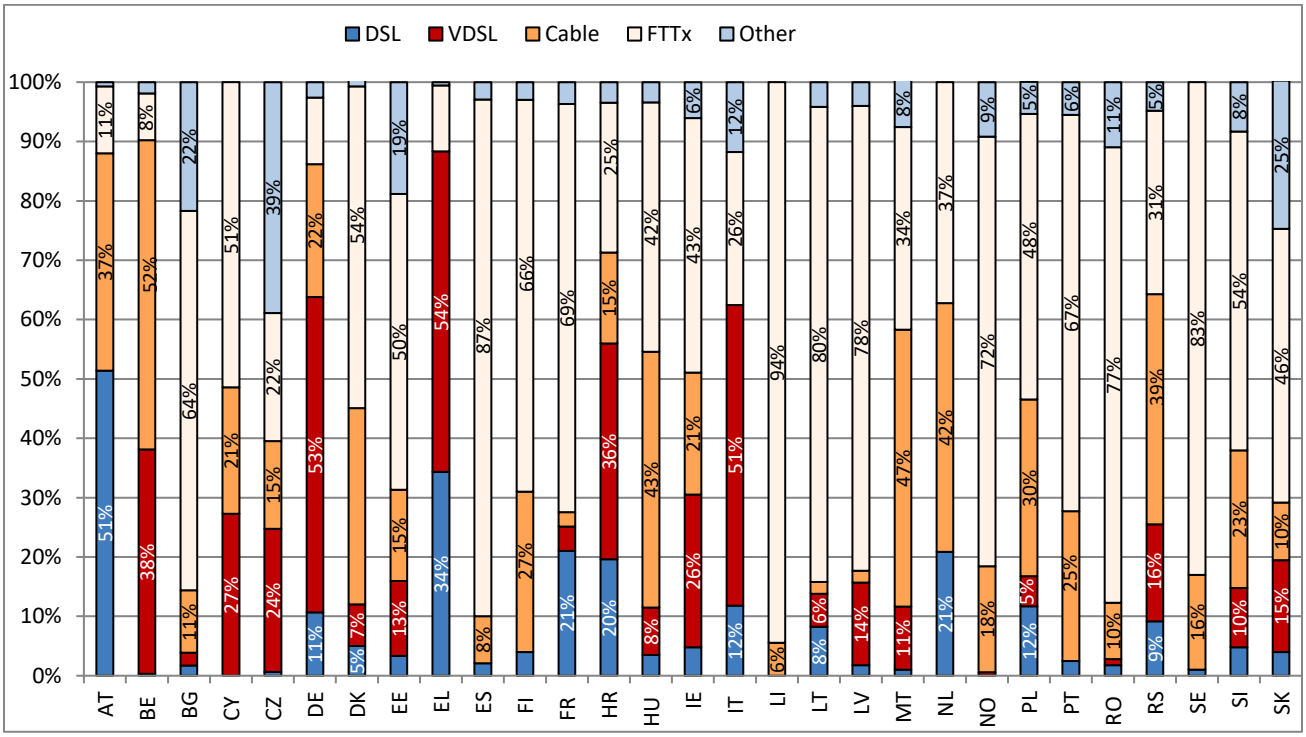
Source: BEREC RA database 2024

[104] CZ: including fixed LTE/5G access (access provided in fixed location). HU: No data provided; ITU value used instead.

The following table shows the percentage share of fixed broadband technology[105]:

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

Figure 64 - Technology Share of Fixed Broadband



Source: BEREC RA database 2024

DSL lines as a percentage of fixed broadband range (where available) from just over 1 per cent in Belgium to over 50 per cent in Austria[106].

VDSL lines as a percentage of fixed broadband range (where available) from just 1 per cent in Romania to more than 50 per cent in Italy, Greece and Germany[107].

Cable as a percentage of fixed broadband ranges (where available) from just over 2 per cent in Lithuania and Latvia to over 50 per cent in Belgium[108].

The use of ***FTTx*** technology is lowest in Belgium (8%) and 11% in Greece, Germany and Austria. A share of more than 80 per cent is reported for Sweden, Lithuania, Spain and Liechtenstein[109].

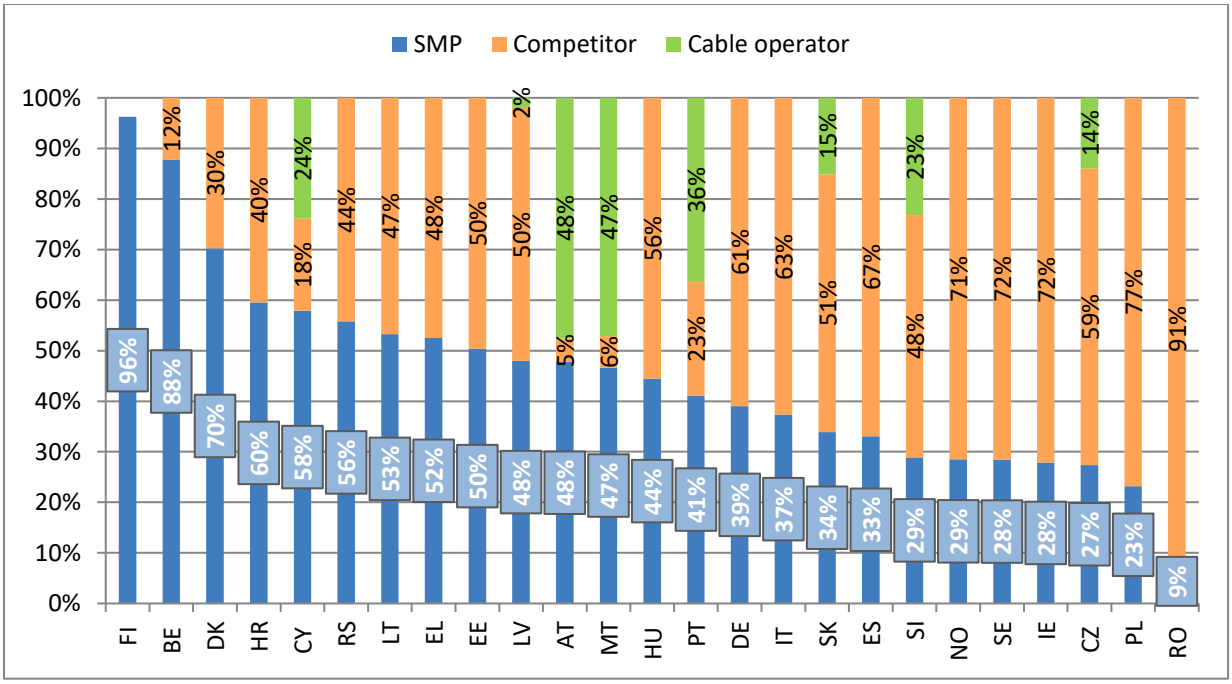
Other technologies reported by some countries include satellite, fixed wireless access (FWA), fixed LTE, vULL etc. These seem to be similar to the previous year. Czechia has the highest share with almost 40 per cent, followed by Slovakia (25 per cent) and Bulgaria (22 per cent)[110].

[105] <5% are not shown
[106] AT: DSL incl. hybrid. NO: included in VDSL. No DSL (0%) in BE, CY, LI.
[107] Data not available in AT (only DSL available), FI, NL. No VDSL (0%) in ES, LI, PT, SE.
[108] No cable (0%) in EL, IT.
[109] RO: excluding HFS and DSL+fibre.
[110] AT: FWA Sat, Rest. DE: Sat. NL: no data. 0% in CY, LI, SE.

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 operator(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 in this section has been provided by NRAs[111]. The data analysis shows considerable market share differences. It points to differences in the national competitive situation, thereby affecting regulatory strategy. Cable shares are included in competitor shares in BE, BG, DK (32%), EE (15%), HR, HU (10%), IE (21%), LT (26%), PL (46%), RO, RS (31%).

Figure 65 - Fixed Broadband Market Share



Source: BEREC RA database 2024

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

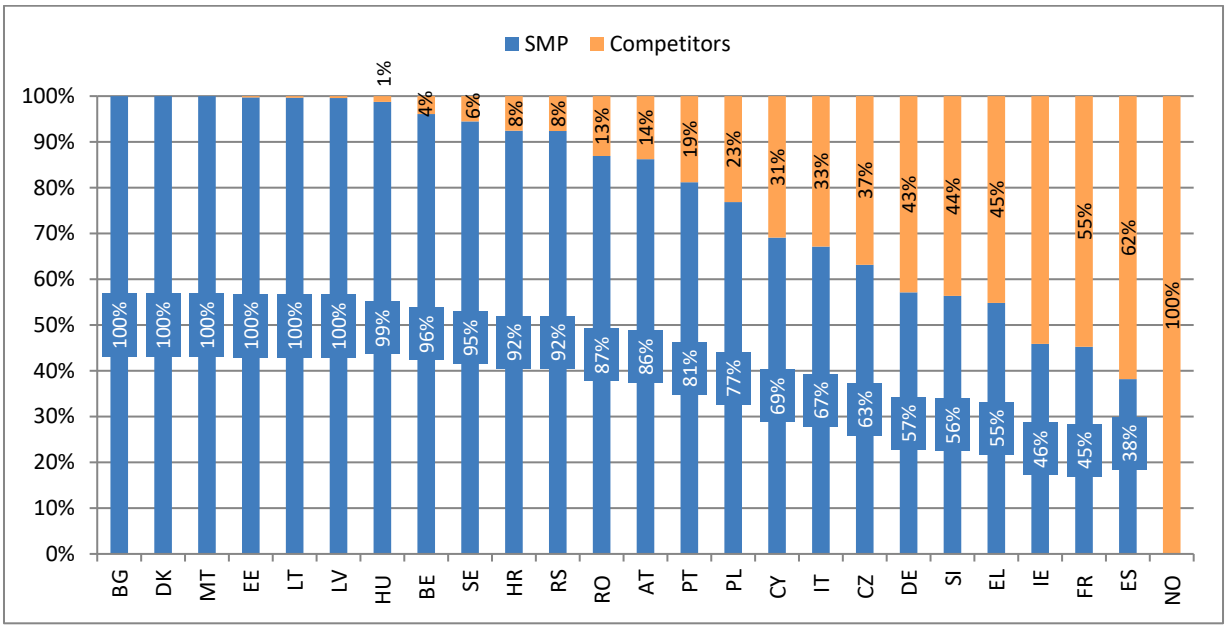
- Share of the SMP(s)/Incumbent operator(s): in some countries, they also operate cable, thus total SMP shares may not be portrayed correctly for these countries. The share ranges from a minimum of 9 per cent in Romania to 96 per cent in Finland.
- Share of competitors: market shares range from 5 per cent in Austria to over 90 per cent in Romania. In some countries, competitor data includes cable.

[111] Confidential in BG, FR, LI, NL. CY: Cable provider is an alternative operator. The percentage includes 2.7% of FTTH subscriptions. CZ: The share of the SMP/Incumbent is represented by O2 Czech Republic. Increase in 2024 is due to the acquisition of a competitor who also has a cable TV network. DE: cable share not recorded (not regulated). ES: No operator can be strictly considered a cable operator since all operators have also FTTH. EL/IT: no cable coverage. NO: cable share included in SMP/competitor shares. RO: incumbent is not SMP. RS: Incumbent also owns cable network which is included in SMP/Incumbent share not in cable share. Cable share is included in competitor share in BE, BG, DK (32%), EE (15%), HR, HU (10%), IE (21%), LT (26%), PL (46%), RO, RS (31%).

- Share of cable operators: not all NRAs record data/record data separately from competitor data. Where it is available/recorded separately shares range from 2 per cent in Latvia to 48 per cent in Austria.

The ***DSL broadband*** share[112] is the traditional domain of SMP/incumbent operators. Their market share ranges from 0 per cent in NO to over 90 per cent in BG, DK, MT, EE, LT, LV, HU, BE, SE, HR, RS. Shown in the same figure are competitor market shares.

Figure 66 - DSL Broadband Market Share



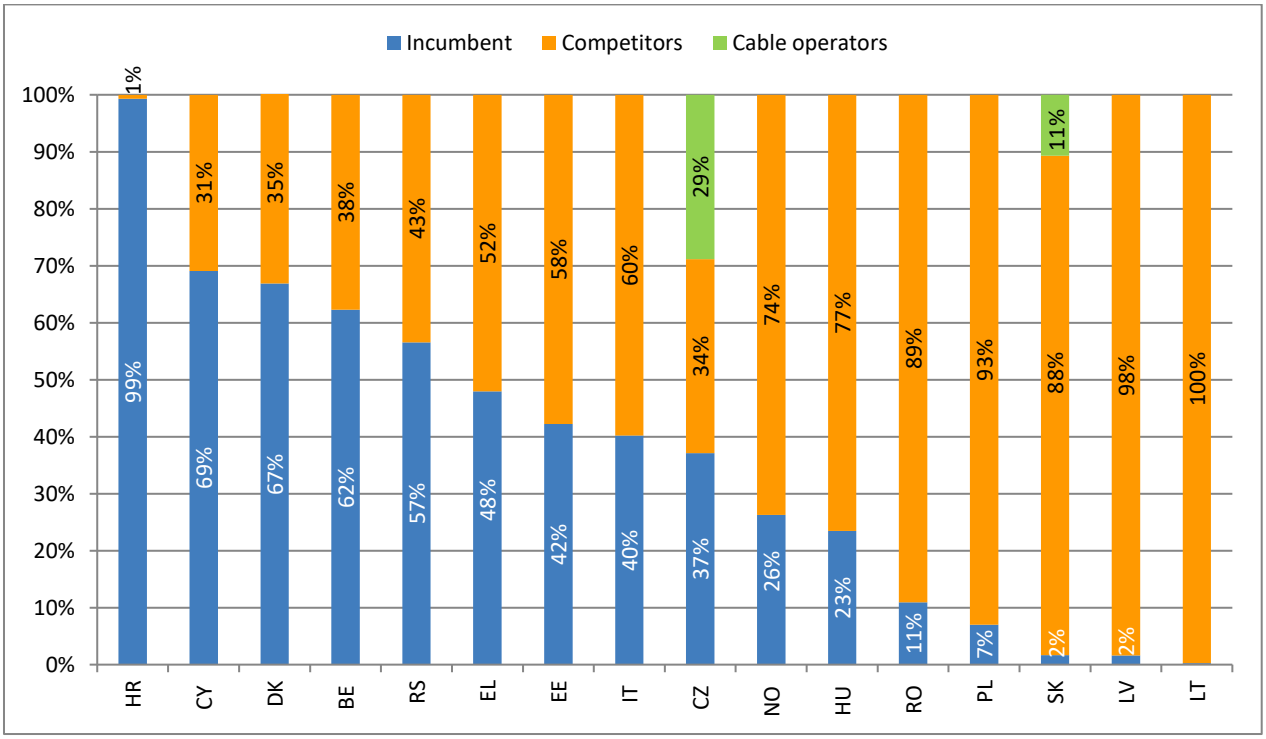
Source: BEREC RA database 2024

[112] Data is confidential in FR, LI, NL, SK. No data in FI. CZ: The share of the SMP/Incumbent is represented by O2 Czech Republic. LI, RO: Incumbent is not SMP.

Due to the increasing 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,[113] the SMP/Incumbent’s share ranges from under 1 per cent in LT to more than 90 per cent in HR. Shown in the same figure are competitor’s and cable operator’s market shares. Cable operator shares are included in competitor shares in BE, LT (65%), PL (20%), RO, RS (42%).

Figure 67 – NGA (FTTB/C) Broadband Market Share

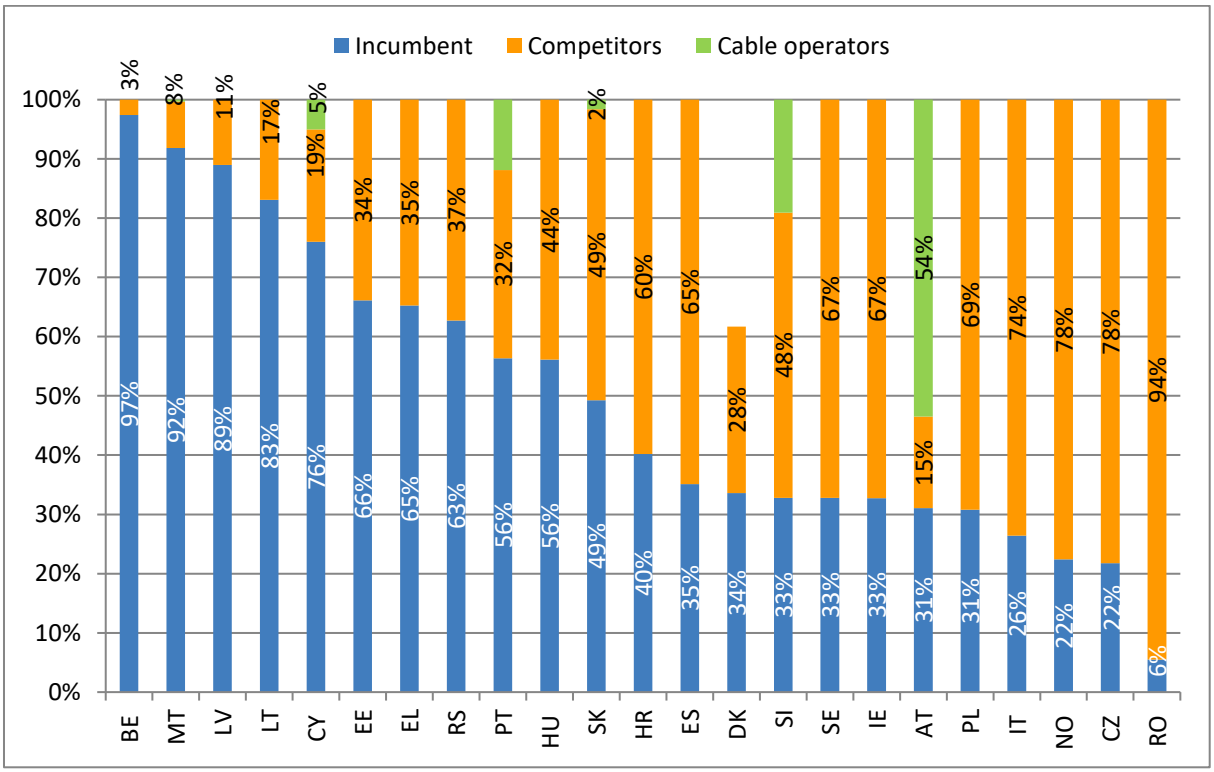


Source: BEREC RA database 2024

[113] Data is confidential in BG, LI, NL. No data in AT (FTTB not available), DE (FTTB/C and FTTH not recorded separately), ES (no FTTB/C subscriptions), FI, FR, IE (figures are included in other categories), MT, PL, SE, SI. BE: Including FTTO lines (fiber to the office) between LEX and customer office and thus go beyond the customer building. Cable included in competitors. CZ: (NGA) include FTTB, HFC (CATV Docsis 3.x) and FTTC which is represented by all VDSL subscriptions. The increase in comparison to the previous year is due to the acquisition of a competitor who also had cable TV network. The share of the SMP/Incumbent is represented by the share of O2 Czech Republic. NO: cable share is included in SMP/competitor shares. RO: FTTN included. Incumbent is not SMP. RS: Incumbent also owns cable network, which is included in SMP/Incumbent share, not in cable share. Cable share is included in competitor share in BE, LT (65%), PL (20%), RO, RS (42%).

Regarding ***NGA (FTTH) broadband*** share[114], the SMP/Incumbent's share ranges from just over 6 per cent in Romania to over 90 per cent in Belgium, Latvia and Malta. Shown in the same figure are competitor's and cable operator's market shares. Cable shares are included in competitor shares in EE (24%), IE (4%), LT (6%), PL (26%), RO, RS (13%).

Figure 68 – NGA (FTTH) Broadband Market Share



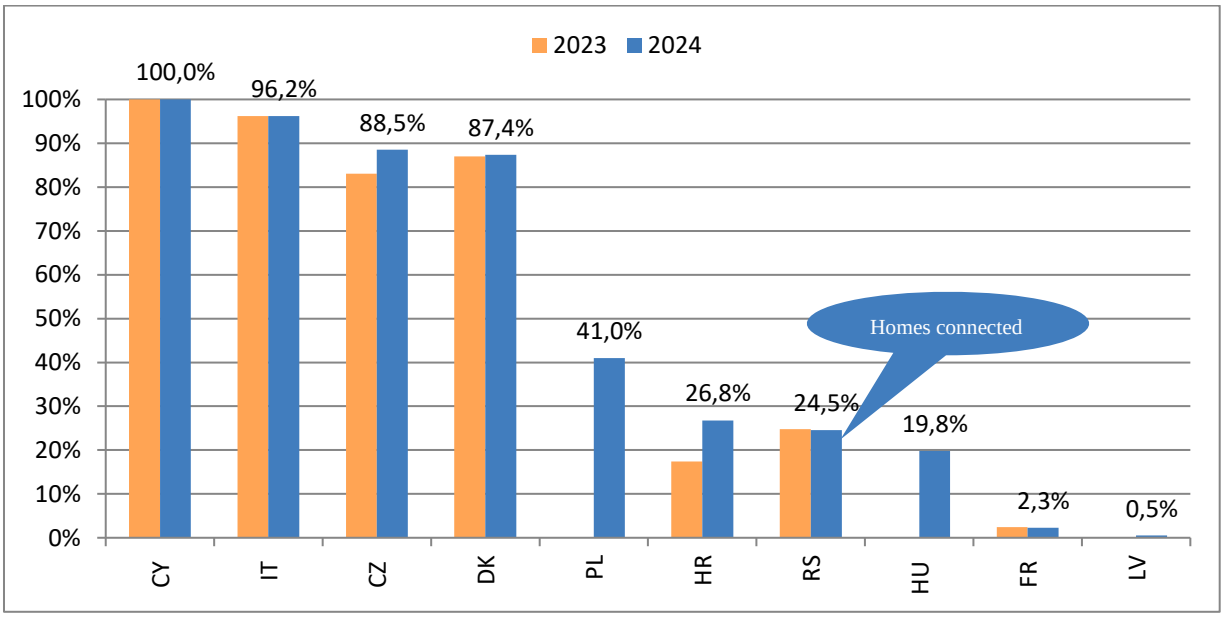
Source: BEREC RA database 2024

[114] Data is confidential in FR, BG, LI, NL Data is not available in DE (FTTB/C and FTTH not recorded separately), FI. CZ: The increase in comparison to the previous year is due to the acquisition of a competitor who also had cable TV network. The share of the SMP/Incumbent is represented by the share of O2 Czech Republic. ES: No operator can be strictly considered a cable operator since all operators have also FTTH. RO: Incumbent is not SMP. RS: Incumbent also owns cable network, which is included in SMP/Incumbent share, not in competitor share. Cable included in competitor share in EE (24%), IE (4%), LT (6%), PL (26%), RO, RS (13%). NO: cable share is included in SMP/competitor shares.

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 2023 are shown. Text bubbles indicates a different way of recording coverage, data are therefore not comparable.

SMP's coverage of Fibre to the Building/Curb (FTTB/C) infrastructure as a percentage of total households[115]***:*** data is shown for 10 NRAs in 2024 (new data in 2024 for PL, HU, LV)[116] with coverage largely unchanged in comparison to the previous year (where available).

Figure 69 - SMP FTTB/C Coverage: % of households



Source: BEREC RA database 2024

SMP's coverage of Fibre to the Home (FTTH) infrastructure as a percentage of total households:[117] data is available for a total of 16 NRAs in 2024 (new data in 2024 for LT, LV, HU)[118]. Coverage has increased in all countries in comparison to the previous year (where available).

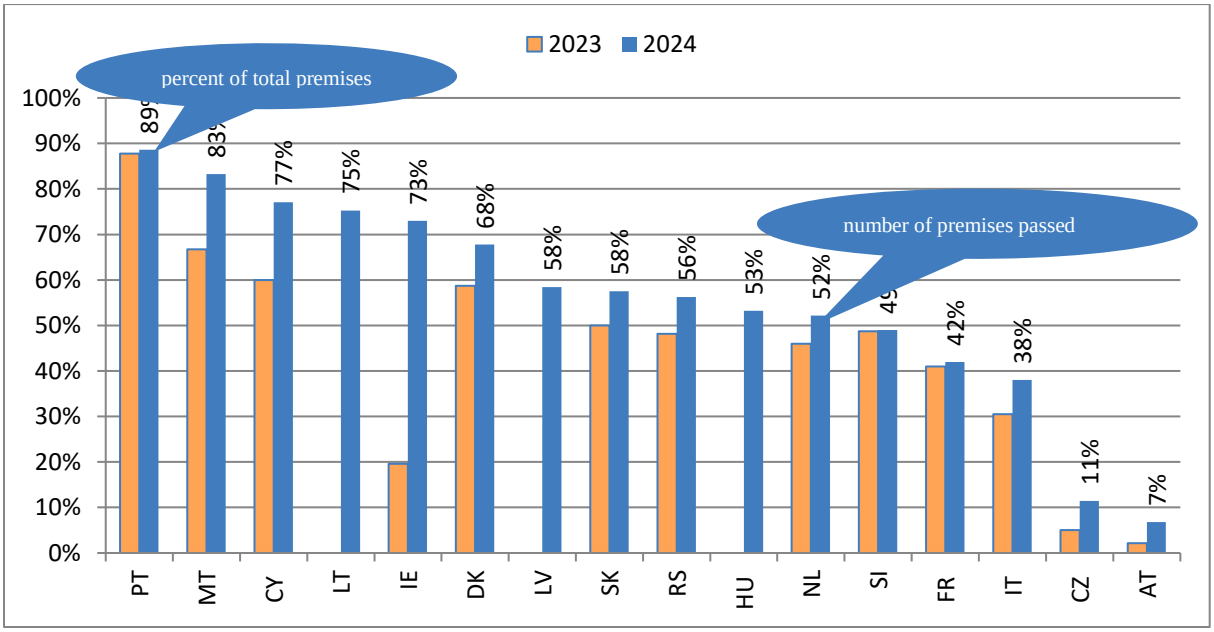
[115] SMP FTTB/C (via SLU) BB coverage: total coverage if more than one operator is present.

[116] Data is confidential in BG, SK, NL and not available in AT (FTTB not available), BE, DE, EE, EL, FI, IE (included in other categories), LT, MT, NO, PT, RO, SE, SI. 0% in ES (no FTTB/C infrastructure), LI (no SMP operator, no BB provider with own FTTx infrastructure), CZ: the increase in comparison to the previous year is due to the acquisition of a competitor (Nej.cz s.r.o.) by the SMP operator. All NGA VDSL lines (coverage). DK: coaxial only. RS: data refers to homes connected.

[117] SMP FTTH BB coverage: total coverage if more than one operator is present.

[118] Data is confidential in BG, SK and not available in BE, DE, EE, EL, ES, FI, HU, NO, PL, RO, SE. 0% in HU, LI (no SMP operator. No BB provider with own FTTx infrastructure). CZ: The increase in comparison to the previous year is due to the acquisition of a competitor (Nej.cz s.r.o.) by the SMP operator IE: Metric derived from COMREG data and using CSO population figure of 2,138,700. lines passed/no. of households NL: number of premises passed. PT: as a % of total premises (refers to cabled premises of Fastfiber - MEO sold its infrastructure to Fastfiber and Fibroglobal - acquired by Fastfiber).

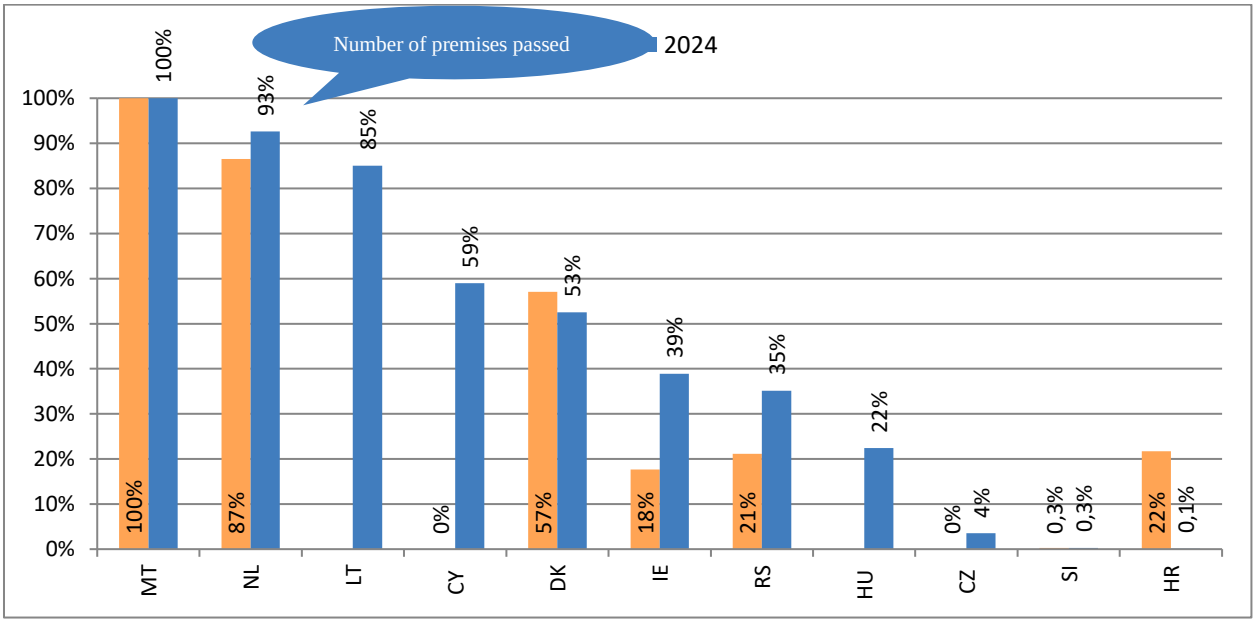
Figure 70 - SMP FTTH Coverage: % of households



Source: BEREC RA database 2024

SMP cable coverage as a percentage of total households:[119] In 2024 data is shown for 11 NRAs (new data in 2024 for LT, HU)[120] and – where available in 2023 – does not differ substantially from the previous year.

Figure 71 - SMP Cable Coverage: % of households

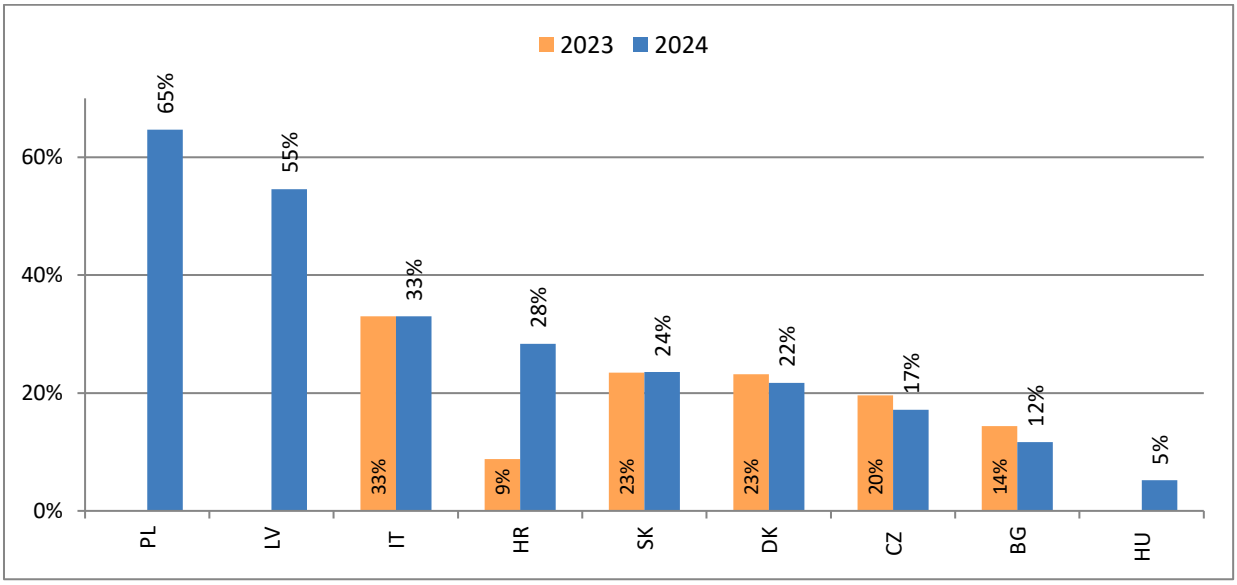


[119] SMP cable coverage: total coverage if more than one operator is present.
[120] Confidential in BG. Not available in BE, EE, EL, FI, NO, RO, SE. 0% in AT, LV, PL, PT, SK, FR, IT. No SMP cable operator/infrastructure in DE, ES, LI. NL: numbers of premises passed.

Source: BEREC RA database 2024

The total coverage of the ***main OAO Fibre to the Building/Curb (FTTB/C) as a percentage of total households***[121] data is shown in 2024 for 9 NRAs (new data in 2024 for PL, LV, HU).[122], which does not substantially differ – where available - from the data provided in 2023.

Figure 72 - Main OAO Coverage on Own Network FTTB/C: % of households

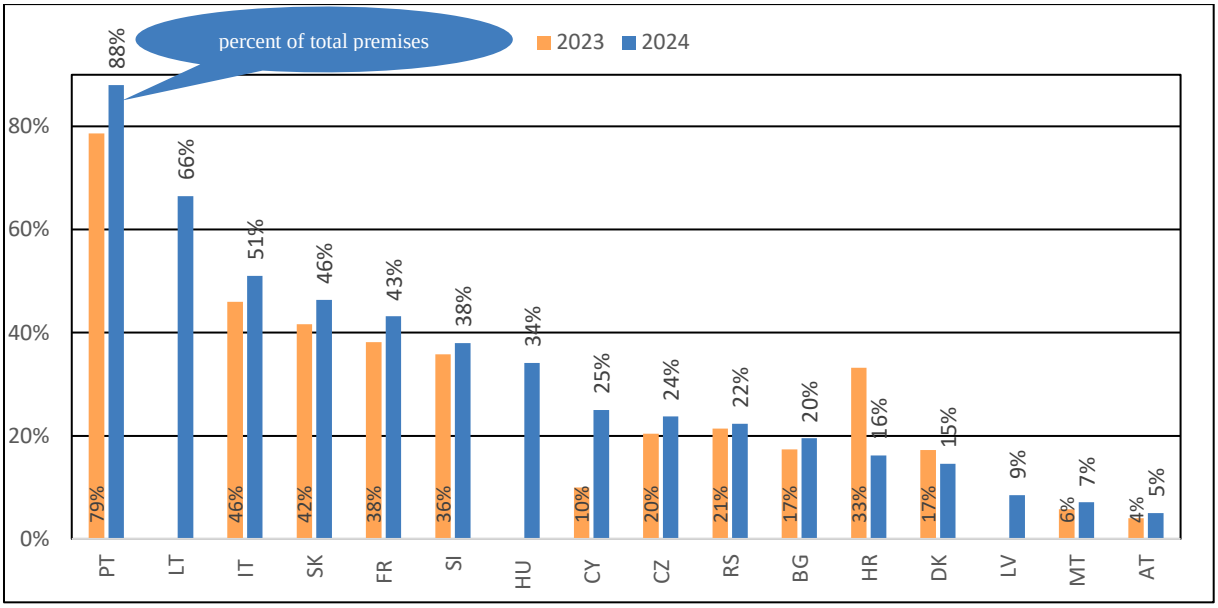


Source: BEREC RA database 2024

Fibre to the Home (FTTH) coverage of the main OAO via their own infrastructure (as a percentage of total households)[123] resulted in data shown for 16 NRAs in 2024 (new data in 2024 for HU, LT, LV)[124]. Where recorded, it has increased in comparison to 2023.

[121] OAO own infrastructure (including third party civil infrastructure) vertically integrated operator FTTB/C BB coverage: total coverage if more than one operator is present.
[122] Confidential in LI, NL. Not available in BE, DE, EE, EL, FI, IE (figures included in other categories), LT, MT, NO, PT, RO, SE, SI. 0% in AT (FTTB not available) CY, ES (no FTTB/C infrastructure), FR. BG: 10.78% coverage excluding Bulsatcom.
[123] OAO own infrastructure (including third party civil infrastructure) vertically integrated operator FTTH BB coverage: total coverage if more than one operator is present.
[124] Confidential in LI, NL. Not available in BE, DE, EE, EL, ES, FI, IE (figures included in other categories), NO, PL, RO, SE. BG: 15.98% coverage excluding Bulsatcom. PT: As % of total premises. If two or more operators are cabling in the same area, the overall effect is not taken into account (double counting). Excludes Fibreglobal.

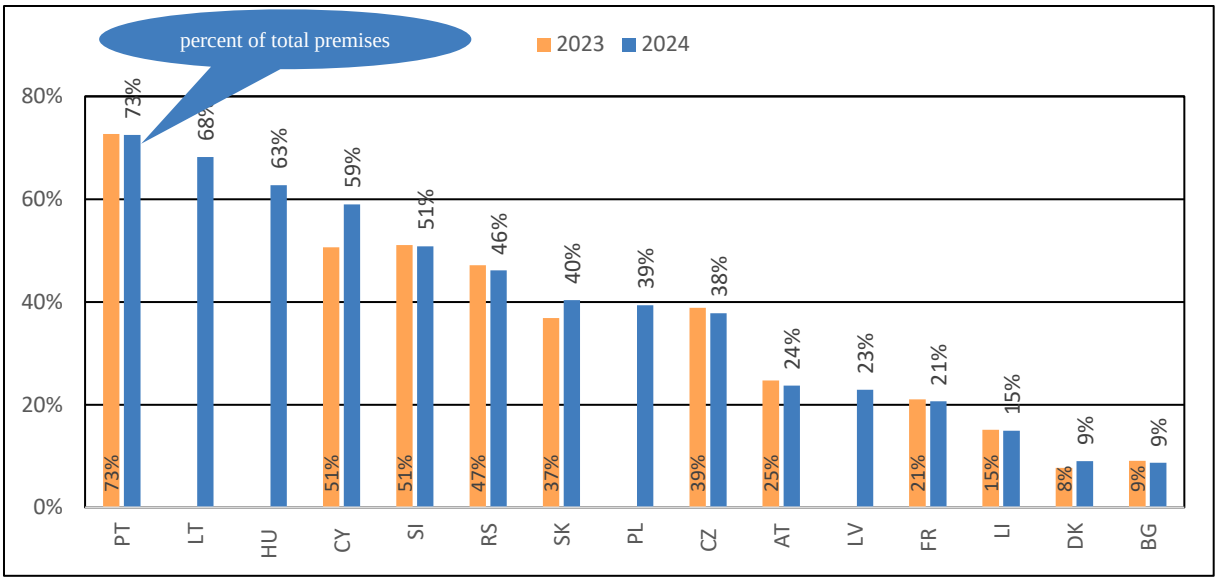
Figure 73 - Main OAO Coverage on Own Network FTTH: % of households



Source: BEREC RA database 2024

The total ***cable coverage of OAO on own cable network (as a percentage of total households)***[125] resulted in data shown for of a total of 15 NRAs in 2024 (new data in 2024 for LT, HU, PL, LV)[126]. Coverage has remained largely unchanged in comparison to the previous year (where available).

Figure 74 - Main OAO Cable Coverage on Own Cable Network: % of households



Source: BEREC RA database 2024

Total ***wholesale only OAO FTTH coverage (as a percentage of total households)***[127] resulted in a data shown for 9 NRAs in 2024[128].

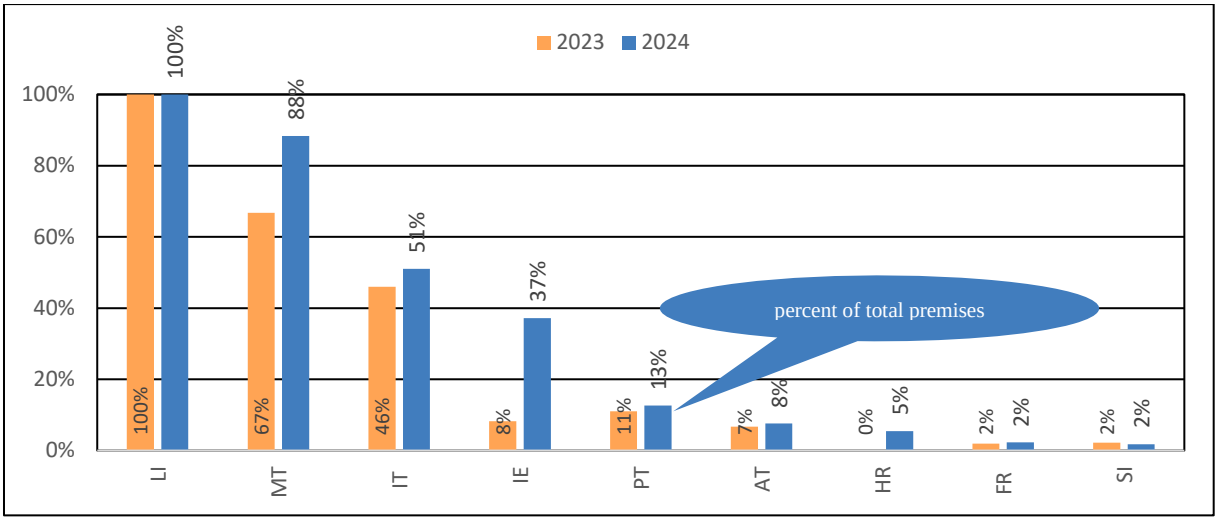
[125] OAO own infrastructure (including third party civil infrastructure) cable coverage: total coverage if more than one operator is present.

[126] Confidential in NL and not available in BE, DE, EE, EL, ES, FI, HR, IE (figures included in other categories), IT, MT, NO, RO, SE. BG: 8.71% coverage excludes Bulsatcom. LI: One OAO operator with a local cable infrastructure. Not SMP. PT: As % of total premises. If two or more operators are cabling in the same area, the overall effect is not taken into account (double counting).

[127] Wholesale only OAO FTTH coverage (total coverage if more than one operator is present). Not available in BE, BG, CZ, DE, DK, EE, EL, ES, FI, HR, LV, NL, NO, PL, RO, SE, SK. IE: NBI/Siro premises passed / no. of households. 2021 data not comparable. LI: Coverage of national infrastructure owner LKW; national coverage will be complete (100%) by the end of 2022. MT: OAO has own infrastructure and VULA agreement with the SMP. PT: As % of total premises, does not include Fastfiber. MT: The percentage provided - same as last year - reflects the OAO's potential to connect clients to fibre via VULA, the OAOs own infrastructure fibre network is 2,16%.

[128] Confidential in NL. Not available in BE, BG, CZ, DE, DK, EE, EL, ES, FI, LT, LV, NO, PL, RO, SE. 0% in CY, HU, RS. IE: Metric derived from COMREG data and using CSO population figure of 2,138,700
lines passed/no. of households. LI: All infrastructure is owned and offered by the regulated open access (SMP) operator LKW, which only operates layer 0 (civil engineering infrastructure) and layer 1 (cables), thus offering to providers access to ducts and fibres, with 100% national coverage in both the access and the backhaul segment. The architecture of the fibre access network is P2P-FTTH, whereby LKW builds P2P-FTTB and the building owners complement to P2P-FTTH. MT: OAO has own infrastructure and a VULA agreement with the SMP hence the SMP coverage is the potential OAO coverage. PT: % of total premises.

Figure 75 - Wholesale Only Main OAO FTTH Coverage: % of households



Source: BEREC RA database 2024

Appendix I

List of Participating Countries/NRAs

The following countries / NRA's have provided data for the 2024 RA Report:

AT Austria (RTR)
BE Belgium (BIPT)
BG Bulgaria (CRC)
CY Cyprus (OCECPR)
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)
LT Lithuania (RRT)
LU Luxembourg (ILR) – last year's data
LV Latvia (SPRK)
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