BEREC
Body of European Regulators for Electronic Communications

BoR (25) 75

BEREC Annual Report for 2024

5 June, 2025

Contents

Foreword by the BEREC Chair 2024

In 2024, BEREC was committed to its ambitious schedule and its role in monitoring and shaping a future-proof regulatory environment for electronic communications across the EU, in line with obligations set in EECC and BEREC Regulation, fostering strategic goals stemming from BEREC strategic documents. The BEREC Strategy 2021-2025 mapped out three main pillars: promoting full connectivity, supporting sustainable and open digital markets, and empowering end users. Our "Action Plan 2030" (published in 2023) outlined that we would broaden our focus to connectivity, the digital ecosystem, network security, and European sustainability goals. Achieving our goals under this action plan means strengthening our capabilities and furthering cooperation with stakeholders, particularly the European Commission (EC).

The Commission's White Paper 'How to master Europe's digital infrastructure needs' assessed the sector and set out scenarios as policy options for the future. It references reports by Enrico Letta on the Future of the Single Market and Mario Draghi on European competitiveness, where the digital ecosystem plays a key role. Drafting BEREC's position paper for the White Paper consultation was a significant challenge but also an opportunity to analyse our sector's future. Our response exemplifies strong cooperation between national regulators and BEREC Working Groups, culminating in high-level strategic input based on detailed technical analysis.

In addition to our planned work, we contributed to implementing the Digital Markets Act (DMA), as well as providing two Opinions on Meta's Reference Offer for WhatsApp interoperability. We have also started work on developing guidelines for the Gigabit Infrastructure Act (GIA) and co-operated with the Commission on its methodology for mapping QoS coverage for broadband services. These initiatives will carry over to 2025 and highlight BEREC's ability to act swiftly thanks to our dedicated working groups, committed members, and to the BEREC Office's support.

Furthermore, already in 2024 BEREC started reflecting on its new strategic document that would cover the 2026-2030 period, however the majority of work needs to be carried over to 2025. This mainly as the EECC review introduces a degree of uncertainty on the scope and direction of BEREC's future regulatory work.

Nevertheless, all other planned activities under BEREC 2024 work programme were successfully completed. We published the final 'Report on the IP Interconnection Ecosystem', a comprehensive, evidence-based document involving extensive stakeholder contributions. BEREC maintains that the IP-IC bargaining situation remains balanced, and markets are functioning effectively.

The lines between electronic communication providers and OTT services are increasingly blurred. Large OTT providers offer services that replace traditional electronic communications,

sometimes collaborating with operators or acting independently. This evolving landscape means we need to review certain regulatory provisions. For example, BEREC in 2024 analysed these interactions, and published reports on cloud services and edge computing, and on large CAPs entering ECN/ECS markets.

5G deployment and take-up in Europe has lagged behind expectations. To better understand this, we launched a public consultation on the evolution of private and public 5G networks, with the final report due in 2025. We believe this will significantly contribute to 5G development in Europe and we remain committed to further exploring other applications of 5G technology.

On end-user rights, we published an Opinion on market and technological developments and their impact on the application of the EECC. BEREC considers that the EECC is sufficiently robust to uphold consumer rights despite sectoral changes, though some refinements could make it more efficient and adaptable to future challenges.

The BEREC Office management also faced challenges, transitioning between three different directors over the year. I extend my gratitude to them and all employees for maintaining high-quality support and executing the budget well despite these changes. However, the Office in Riga is feeling the impact of geopolitical uncertainty. Cybersecurity risks have increased, reinforcing the need for strong protection measures – an area where BEREC must lead by example.

We signed Working Arrangements with Ukraine's NCEC at the BEREC Stakeholder Forum in Brussels and with Moldova's ANRCETI in March 2025, expanding our non-voting membership. We continue to engage with EU bodies (e.g. RSPG, ERGA, ENISA,) and international partners (EaPeReg, EMERG, REGULATEL, ITU, OECD), recognising that experience sharing is essential for navigating digital developments and safeguarding European interests. We continue to engage with the European Parliament, the Council and EC providing expert advice upon request or on our own initiative.

Lastly, may I say that chairing BEREC has been challenging yet rewarding, made easier by the support of my team, the BEREC Office, working group co-chairs, drafters, and colleagues in the Board of Regulators and Management Board. I extend special thanks to the 2024 BEREC Mini Board for their unwavering support. I wish my dear colleague Robert Mourik from ComReg the same success in his chairmanship and am confident that BEREC will continue to serve the European Union and its citizens effectively.

Tonko Obuljen

BEREC Chair 2024

PART A: Annual Report on market developments in the electronic communications sector in 2024 – in accordance with Article 4(1)(j)(v) of Regulation (EU) 2018/1971

Annual Report on market developments in the electronic communications sector in 2024, in accordance with Article 4(1)(j)(v) of Regulation (EU) 2018/1971 of the European Parliament and of the Council of 11 December 2018 establishing the Body of European Regulators for Electronic Communications (BEREC) and the Agency for Support for BEREC (BEREC Office).

Executive summary

The Body of European Regulators for Electronic Communications' (BEREC) Annual Report for 2024 highlights the key developments and market trends in the electronic communications sector in Europe over the past 12 months. The report focuses on market dynamics and developing European Union public policies and regulatory practices, giving BEREC's perspectives on these matters, based on the collective expertise and knowledge of the member national regulatory authorities (NRAs). It also describes BEREC's own contribution to the electronic communications sector in Europe. The analysis in this report includes qualitative reasoning based on information from BEREC Working Groups (WGs) and quantitative data from periodic BEREC data collection and other public documents.

In line with the provisions of the European electronic communications regulatory framework, BEREC spent 2024 working on approving and publishing a considerable number of regulatory best practice-related documents and implementation reports, with the aim of having transparent, standardised and effective legal provisions, and ensuring consistent and predictable application of the rules across the European digital single market. Part A of this report showcases the most substantial aspects of BEREC's 2024 work, while Part B summarises the key deliverables that were set out in BEREC's Work Programme 2024 (published in late 2023).

The report highlights how this programme has been successfully implemented under the Chairmanship of Mr Tonko Obuljen (HAKOM, Croatia), focusing on BEREC's three strategic goals: promoting full connectivity, supporting sustainable open digital markets and empowering end users.

The key deliverables underscore BEREC's commitment to independent, consistent and high-quality regulation of digital markets for the benefit of Europe and its citizens (BEREC strategy 2021-2025). At the same time, they show BEREC's continuous engagement and cooperation with stakeholders and international organisations, as well as BEREC's underlying analytical and monitoring work that helps BEREC to react and provide input and Opinions based on comprehensive data collection.

1. Introduction

This section of the Annual Report highlights important market trends and developments in the European electronic communications sector in 2024, focusing on market dynamics and developing European Union public policies and regulatory practices under Article 4(1)(j)(v) of the BEREC Regulation.

Presented from the perspective of BEREC, the analysis integrates insights gained from the expertise and knowledge of the member NRAs.

Analysis in this section includes qualitative reasoning based on information from BEREC's WGs and quantitative data from periodic BEREC data collection and other public documents.

It pays particular attention to Broadband and Very High Capacity Networks, Mobile Broadband and 5G, Regulatory Accounting and Evolution in Digital Markets.

2. Market trends

2.1. Broadband and Very High Capacity Networks

Article 3(2)(a) of the EECC[1] stipulates that the national regulatory and competent authorities other than BEREC, the Commission and the Member States shall, inter alia, pursue the new general objective of promoting connectivity and access to, and take-up of, very high capacity networks, including fixed, mobile and wireless networks, by all citizens and businesses of the EU. This objective is also at the core of the EU's ambition to move towards a Gigabit Society and the concept of a very high capacity network is therefore used in other EU initiatives, e.g. the Gigabit Infrastructure Act.

Connectivity and the use of electronic communications are an integral part of European society and welfare. Very high capacity networks support innovation in content-rich internet services, strengthen the EU's international competitiveness and have enormous potential to deliver benefits to consumers and businesses across the European Union.

Article 2(2) of the EECC defines the term 'very high capacity network' and Article 82 states that BEREC will issue guidelines on the criteria that a network has to fulfil in order to be considered a very high capacity network, in particular in terms of down-and uplink bandwidth, resilience, error-related parameters, latency and its variation. In October 2023, BEREC updated the first version of these Guidelines (published in October 2020) with a criterion for

[1] European Electronic Communications Code.

wireless networks. These Guidelines[2] specify (paragraphs 19 and 22), in accordance with the EECC, that any network that fulfils one (or both) of the two criteria below is a fixed very high capacity network[3];

- Any network providing a fixed-line connection with a fibre roll-out at least up to the multi-dwelling building (i.e. FttB or FttH).
- Any network providing, irrespective of the underlying technology, a fixed-line connection that is capable[4] of delivering, under usual peak-time conditions, services to the end-users with the following quality of service:

Quality of Service Parameter	Threshold
Downlink data rate	≥ 1000 Mbps
Uplink data rate	≥ 200 Mbps
IP packet error ratio	≤ 0.05%
IP packet loss ratio	≤ 0.0025%
Round-trip IP packet delay	≤ 10 ms
IP packet delay variation	≤ 2 ms
IP service availability	≥ 99.9% per year

Article 22 of the EECC provides that national regulatory and/or other competent authorities shall conduct a geographical survey of the reach of electronic communications networks capable of delivering broadband by 21 December 2023. This geographical survey may also include a forecast of the reach of broadband networks, including very high capacity networks.

Article 22(7) of the EECC also states that BEREC shall issue guidelines to assist national regulatory and/or other competent authorities on the consistent implementation of these

[2] BoR (23) 164, see: https://www.berec.europa.eu/en/document-categories/berec/regulatory-best-practices/guidelines/berec-guidelines-on-very-high-capacity-networks-2023

[3] In addition, these BEREC guidelines (paragraphs 18 and 21) also determined the criteria a network has to fulfil in order to qualify as a wireless very high capacity network.

[4] It is sufficient that the network is capable of delivering the quality of service, irrespective of the question, if a service of such quality is actually offered to customers.

obligations (which BEREC published in March 2020[5], March 2021[6] and June 2021[7]), and use the term 'very high capacity network' in line with Article 2(2) of the EECC and the BEREC Guidelines on very high capacity networks[8]. Therefore, in the future, deployment of very high capacity networks may be tracked using these data.

According to the study 'Broadband coverage in Europe 2023'[9] commissioned by the EC, VHCN coverage in the EU[10] increased significantly between 2013 and 2023, from 16% to 63% of households (see Figure 1 below[11]).

In four countries (Spain, Romania, Portugal and Iceland), the FTTP coverage, and therefore also fixed very high capacity network coverage, is already higher than 90 %, while no country had FTTP coverage below 20% and only two countries – Belgium and Germany – had coverage below 30 %.

Coverage of different types of broadband networks in the EU[11] increased between 2022 (data of the last report) and 2023 as follows:

By mid-2023, the availability of Next Generation Access (NGA) services (VDSL, VDSL2 Vectoring, DOCSIS 3.0, DOCSIS 3.1 and FTTP) in the EU reached 92.9 % of households. This equates to a 1.6 percentage point increase compared to the end of June 2022[12].

[5] BoR (20) 42, BEREC Guidelines to assist NRAs on the consistent application of Geographical surveys of network deployments, 05.03.2020, see: https://berec.europa.eu/eng/document_register/subject_matter/berec/regulatory_best_practices/guidelines/9027-berec-guidelines-to-assist-nras-on-the-consistent-application-of-geographical-surveys-of-network-deployments

[6] BoR (21) 32, BEREC Guidelines on Geographical surveys of network deployments. Article 22 (2), 22 (3) and 22 (4), 11.03.2021, see: https://berec.europa.eu/eng/document_register/subject_matter/berec/regulatory_best_practices/guidelines/9884-berec-guidelines-on-geographical-surveys-of-network-deployments-article-22-2-22-3-and-22-4

[7] BoR (21) 82, BEREC Guidelines on Geographical surveys of network deployments. Verification of information, 10.06.2021, see: https://berec.europa.eu/eng/document_register/subject_matter/berec/regulatory_best_practices/guidelines/9980-berec-guidelines-on-geographical-surveys-of-network-deployments-verification-of-information

[8] BoR (23) 164, BEREC Guidelines on Very High Capacity Networks (2023), 05.10.2023, see: https://www.berec.europa.eu/en/document-categories/berec/regulatory-best-practices/guidelines/berec-guidelines-on-very-high-capacity-networks-2023

[9] Digital Decade 2024: Broadband Coverage in Europe 2023, see: https://digital-strategy.ec.europa.eu/en/library/digital-decade-2024-broadband-coverage-europe-2023

[10] EU-27.

[11] Figure 1 does not include VHCN that are not FttB/FttH but qualify on the basis of performance as VHCN.

[12] Broadband coverage in Europe 2023, page 8.

Figure 1: FTTP coverage by country in 2023

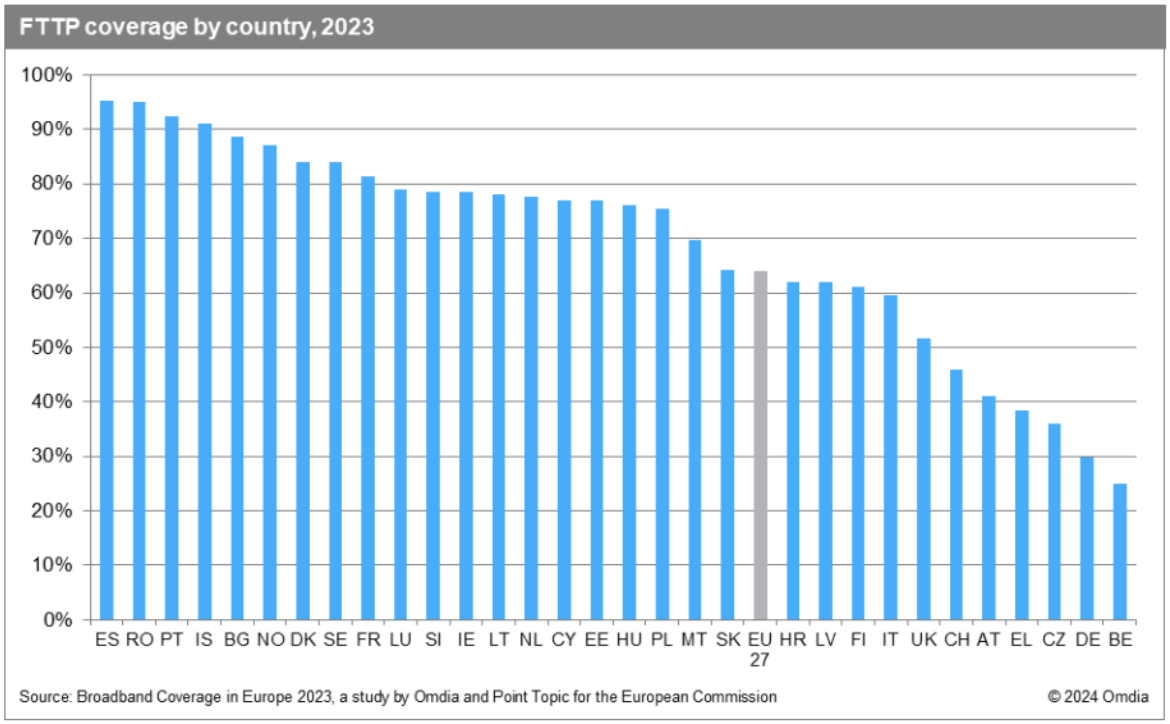
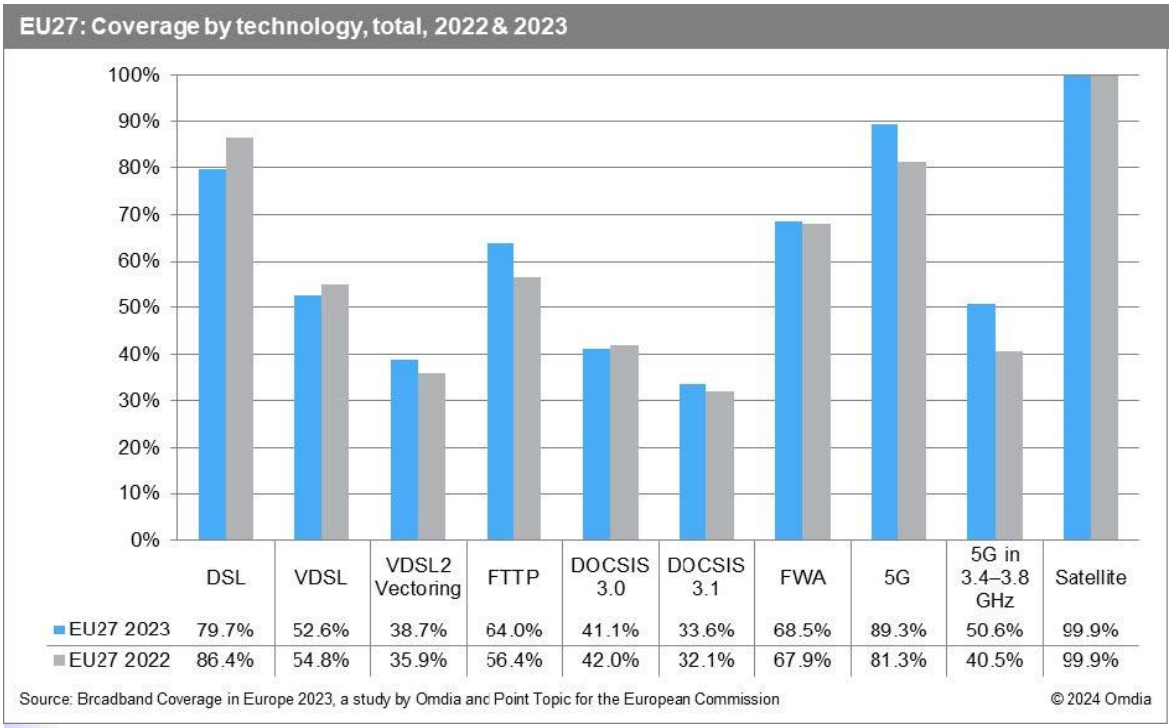


Figure 2: Broadband coverage in Europe by technology in 2022 and 2023



Since the last report, we have started to see the coverage of DSL and VDSL decline for the first time, with VDSL2 Vectoring the only DSL technology that is still increasing in coverage from approx. 36 % to 39 %. Having been one of the main drivers of NGA coverage growth since 2013, VDSL coverage growth began to stagnate in 2021. As in previous years, cable DOCSIS 3.0 and 3.1 coverage remained stable. FTTP was responsible for the highest increase in coverage in the EU, gaining almost 8 % points. FTTP already had the broadest coverage of all fixed NGA network technologies and is expected to continue to grow at a high rate.

Turning now to mobile networks, long-term evolution (LTE) was being rolled out from 2013 to 2022 taking coverage from 60% to 99.8 %, already reaching 99 % by 2018. The 5G roll out began in around 2020 and increased rapidly, reaching an EU-wide coverage rate of 89 % in 2023.

2.2. Mobile broadband and 5G

Mobile broadband take-up in the EU continued to grow in 2024. According to DESI 2024 indicators[13], the average number of mobile data subscriptions per 100 people in the EU (aged 16-74) reached almost 90 %, compared to 86.5 % in 2023.

According to DESI 2024 (data from 2023), 5G coverage[14] reached 89.30 % of the households in the European Union, increasing from 81.26 % in 2023. The 5G coverage of 16 countries (Cyprus, Malta, Netherlands, Italy, Denmark, Finland, Luxemburg, Germany, Portugal, Greece, Czechia, France, Austria, Spain, Sweden and Lithuania) is higher than 90 % of the households. Eight EU countries (Estonia, Ireland, Hungary, Croatia, Slovenia, Slovakia, Poland and Bulgaria) have 5G coverage between 60 % and 90 %. Three countries have 5G coverage for fewer than 60 % of households (Latvia, Belgium and Romania). There is 5G coverage only within the 3.4-3.8 GHz band for 50.60 % of households in the European Union.

In 2024, 73.40 % of the 5G spectrum in 5G pioneer bands[15] was assigned and ready for 5G use across the EU. 24.62 % of the total population in the EU have 5G mobile subscriptions, defined as SIM cards that have generated any internet traffic on a domestic 5G network in the last 90 days. The total number of edge nodes deployed in the EU providing latencies below 20 milliseconds was 1 186.

[13] DESI indicators, 5G coverage, see: https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators?period=desi_2024&indicator=desi_5gcov&breakdown=total_pophh&unit=pc_hh_all&country=AT,BE,BG,HR,CY,CZ,DK,EE,EU,FI,FR,DE,EL,HU,IE,IT,LV,LT,LU,MT,NL,PL,PT,RO,SK,SI,ES,SE

[14] At least one 5G mobile network.

[15] These bands are 700 MHz (703-733 MHz and 758-788 MHz), 3.6 GHz (3400-3800 MHz) and 26 GHz (1000 MHz within 24250-27500 MHz). All three spectrum bands have an equal weight.

2.3. Regulatory accounting

The 2024 Regulatory Accounting in Practice (RAP) Report gives an overview of the main remedies imposed on significant market power (SMP) operators in relevant markets subject 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.

This is the 20th 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 NRAs and covers the implementation of regulatory cost accounting methodologies in the national market situations. As 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 EC 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 previous 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 (section 3.5). In this context some new elements about BU models are reported. The 2013 NDCM Recommendation has been updated and substituted in February 2024 by the new Gigabit

Recommendation[16], but as the cut-off date for this report was 1st April 2024, the majority of regulatory decisions were still referring to the NDCM Recommendation. 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 previous reports, 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 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 of this year's report is related to the adoption of the EC Notice on WACC.

Key findings

The RAP 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 RAP 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 of the report, 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

[16] 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.

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 concentrated. 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 17-19 of the report).

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 EECC.

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 EECC, 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 depth analysis on the application of the regulatory framework of the 2013 NDCM Recommendation, also in light of the new Gigabit Recommendation, has 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 (24) 102), the 2024 BEREC RAP 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)[17] 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 for a long time prior to the EC 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 EC WACC 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 EC WACC Notice continues to have a material convergent effect.

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.

2.4. Evolution in digital markets

Digital markets have undergone significant evolution in the last decades, driven by technological advances (such as virtualisation and cloudification, internet-based platforms and services, and AI), changing consumer behaviour and giving rise to emerging trends. Moreover, some key European legislation (such as the Digital Markets Act – DMA, the Digital Services Act – DSA and the Data Act) has entered into force or become applicable in 2024. BEREC

[17] Cf. BoR (13) 110.

has carried out several analyses to better assess these changes and to contribute to the implementation of these regulations.

Under Article 7 DMA, the designated gatekeeper Meta was required to provide interoperability with its number-independent interpersonal communication services (NI-ICS) core platform services WhatsApp and Messenger. Since January 2024, the EC asked BEREC to deliver three Opinions on Meta's *draft* reference offer, Meta's *final* reference offer for WhatsApp interoperability (BoR (24) 19 and BoR (24) 78), as well as on the reference offers for WhatsApp and Messenger (BoR (25) 21). BEREC is continuing to engage with and assist the EC in this evaluation and in the implementation of the DMA, both in application of Article 7 and by contributing to the DMA High-Level Group and its subgroups.

Beyond the DMA, BEREC is also contributing to the implementation of other digital regulations. Several BEREC members are also Digital Services Coordinators (DSCs) under the DSA and they are also likely to be designated as competent authorities under the Data Act. BEREC ran several workshops, as well as knowledge-building and experience-sharing activities, throughout 2024 to ensure effective cooperation among its members.

To analyse the evolution of the markets for electronic communications networks and services (ECN/ECS), BEREC also published a report on the entry of large content and application providers (CAPs) into the ECN/ECS (BoR (24) 51). Here, BEREC highlights how large CAPs have become prominent in the internet ecosystem and are increasingly insourcing what was formerly purchased from traditional ECN/ECS providers to a large degree through the deployment of their own physical and network infrastructure.

Moreover, some market and technological developments, such as the rapid emergence of generative AI, have also significantly changed the dynamics in the internet ecosystem, and introduced several challenges. To contribute to the debate, BEREC responded to the call for contributions on AI and virtual worlds launched by the EC in January 2024 and stressed the importance of assessing the impact of AI not only on competition dynamics, but also on internet openness, end-user rights, the environment and cybersecurity (BoR (24) 68).

3. Regulatory framework

While 2024 saw the process for transposing and implementing Directive 2018/1972 establishing the EECC progress further with all Member States notifying the Commission of their completed transposition, the Commission itself started reflecting on possible regulatory adjustments to the sectoral legislative framework by publishing the White Paper – How to master Europe's digital infrastructure needs? (hereinafter the White Paper) on 21 February 2024. The White Paper elaborates on the trends and challenges in the digital infrastructure sector and, considering the issues identified, puts forward possible scenarios to master the transition to the digital networks of the future.

The Commission launched a public consultation on the proposed scenarios that ended 30 June 2024. On 28 June 2024, BEREC approved what would be its input to the Commission's public consultation, setting out its own views on the ideas put forward in the document.

4. Developments related to the Openness of the Internet

BEREC published the *BEREC Report on the IP Interconnection Ecosystem* this year, contributing to the evolving discourse on IP interconnection (IP-IC). This Report reassesses the conclusions drawn in 2017 and provides a detailed analysis of the current state of IP-IC in Europe.

A draft of the updated report was made available for public consultation from 11 June to 1st August 2024. During this period, BEREC received 36 responses from various stakeholders. 31 contributions have been published, as five stakeholders provided only a confidential version, and one provided both a public and a confidential version. One additional contribution was received after the above-mentioned deadline and has thus not been for this public consultation. In line with its policy on public consultations, BEREC published a summary of all contributions, respecting confidentiality requests, in December 2024.

BEREC also published its annual report on the implementation of the Open Internet Regulation (OIR) in October 2024, covering the period from 1 May 2023 to 30 April 2024. This report provided a comprehensive overview of the activities undertaken by NRAs in enforcing the OIR and adhering to the associated BEREC Open Internet Guidelines.

An internal workshop was held to examine the use of DNS-blocking under Article 3(3)(b) of the OIR. This initiative aimed to exchange information between NRAs and featured presentations by invited experts. The workshop was deemed particularly relevant due to the rising frequency of security threats such as phishing and cyberattacks.

As in previous years, BEREC provided a forum for NRAs to share information and to enable the consistent application of the OIR for all of the topics related to the OIR.

In 2024, BEREC members continued to relate experiences on Internet Access Services (IAS) quality measurement tools in order to develop them further. The related working group was an opportunity to share best practice.

5. International roaming developments

Roaming charges in the European Union and the European Economic Area (EEA) became a thing of the past on 15 June 2017.

When the Roaming Regulation (Regulation (EU) 2015/2120, published in the Official Journal of 26 November 2015, amending Regulation (EU) No 531/2012) entered into force, it allowed consumers to use their mobile phones anywhere in the EU, just as in their home country,

without any additional surcharges ('Roam Like at Home' – RLAH). Only in exceptional cases may operators levy a surcharge for EU roaming.

In July 2022, the new Roaming Regulation (EU) 2022/612 came into force. This regulation contains RLAH provisions and additional provisions on QoS, transparency, emergency communications, VAS, etc.

To assess the competitive developments and the impact of RLAH on EU-wide roaming markets, BEREC regularly collects data from NRAs on changes in retail and wholesale charges for regulated voice, SMS and data roaming services. These also include wholesale charges applied to balanced and unbalanced roaming traffic. BEREC must also collect data on wholesale roaming agreements that are not subject to the maximum wholesale roaming charges, and on the implementation, at a wholesale level, of contractual measures to prevent permanent roaming or anomalous or abusive usage of wholesale roaming access for purposes other than roaming. BEREC uses the collected data to report regularly on the evolution of pricing and consumption patterns in the Member States for both domestic and roaming services, changes in actual wholesale roaming rates for unbalanced traffic between roaming providers, and the relationship between retail prices, wholesale charges and wholesale costs for roaming services.

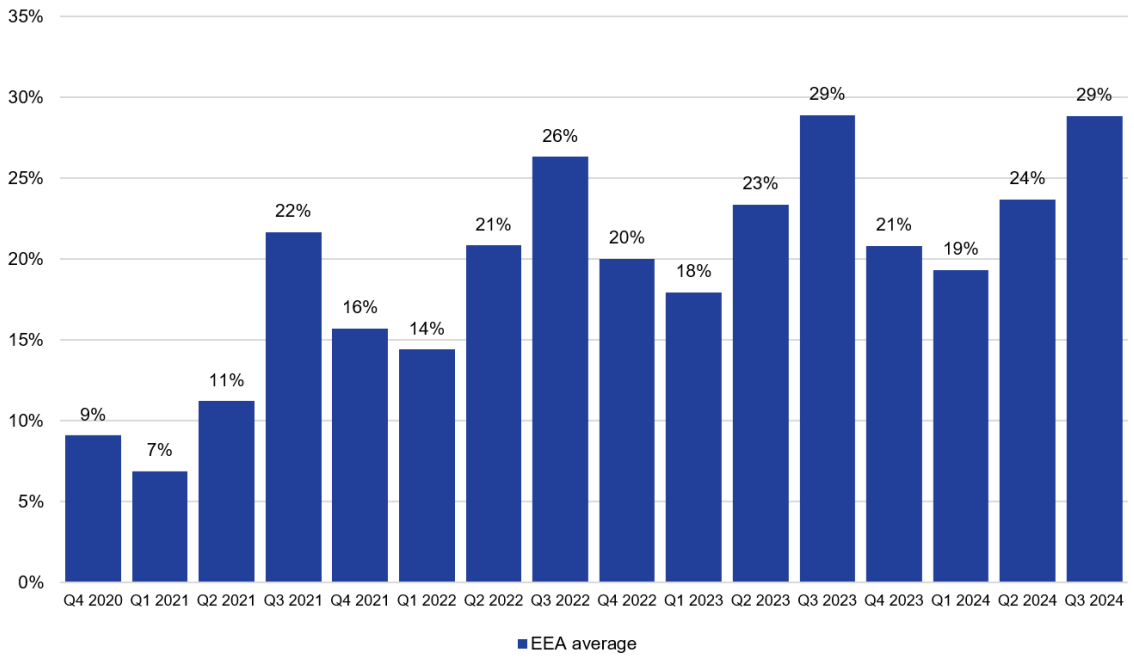
The new Regulation slightly amends the data collection provisions, moving from biannual to annual data collection and including additional indicators. The introduction of RLAH services, coupled with the growing demand for data services, has changed the international roaming market. One relevant outcome of this is that RLAH services have triggered a substantial increase in international roaming traffic.

According to the 31st BEREC Report on International Roaming Benchmark Data (BoR (25) 26)[18], the European roaming market continued to grow in 2024, both in terms of the number of users and the volume of data consumed while roaming.

The share of EEA subscribers who roamed at least once per quarter reached 29% in Q3 2024, matching the previous peak observed in Q3 2023 (see Figure 3). This sustained level of roaming activity suggests that Roam Like at Home (RLAH) has become a deeply embedded aspect of consumer behaviour across the EU/EEA. While seasonal fluctuations remain visible, the data also reflects a general increase in off-peak usage, pointing to broader and more consistent roaming patterns throughout the year.

Figure 3: Percentages of subscribers that were roaming at least once in the concerned quarter in the EEA, compared to the total number of subscribers who have roaming enabled subscriptions

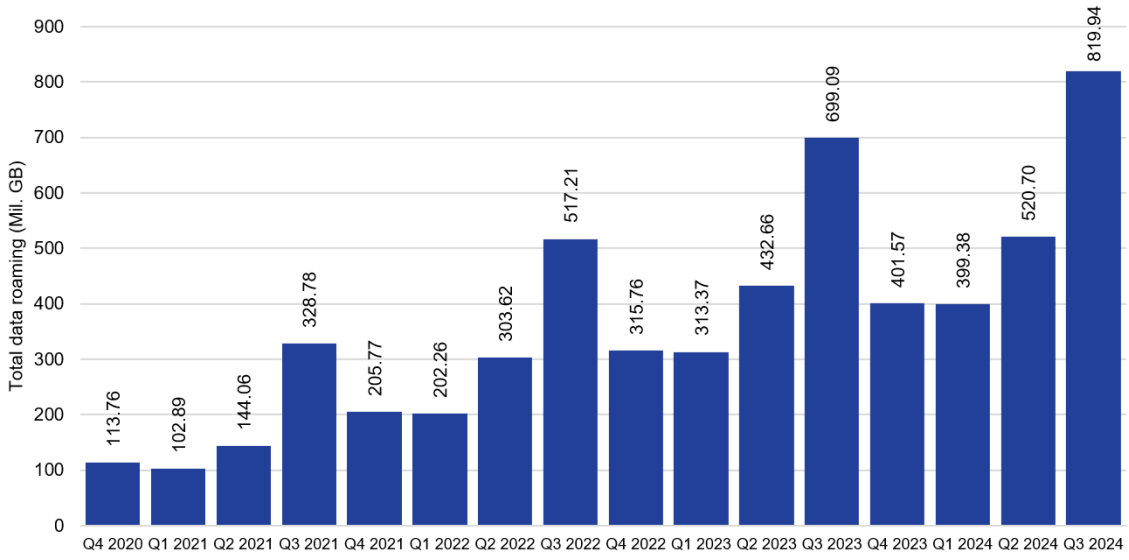
[18] BoR (25) 26, 31st BEREC International Roaming Benchmark Data and Monitoring Report, 13.03.2025, see: https://www.berec.europa.eu/en/all-documents/berec/reports/31st-berec-international-roaming-benchmark-data-and-monitoring-report



In terms of data consumption, total roaming volumes reached a record 819.94 million GB in Q3 2024, up from 699.09 million GB in Q3 2023 – a 17% year-on-year increase (see Figure 4). This growth reflects not only increased international travel but also users' increased consumption while abroad.

Overall, the data collected by BEREC in 2024 highlights a robust and expanding roaming market, with growing reliance on mobile data by subscribers across quarters.

Figure 4: Total data roaming volumes in the EEA per quarter



6. Conclusions

Europe has set ambitious connectivity targets, as it reaches for full connectivity, i.e. gigabit connectivity for all and 5G in all populated areas. BEREC, as a key player in shaping the regulatory landscape, enables and underpins these aims by enabling the roll-out of high capacity networks, sustaining open digital markets, and fostering competition and innovation to achieve the goal of full connectivity for both households and businesses. In 2024, we made clear progress and substantial advances towards this goal.

The use of Next Generation Access (NGA) networks and VHCNs continues to rise, as does 5G coverage. By mid-2023, the availability of NGA services (VDSL, VDSL2 Vectoring, DOCSIS 3.0, DOCSIS 3.1 and FTTP) in the EU had reached 92.9 % of households, equating to a 1.6 percentage point increase on the end of June 2022. Mobile broadband take-up in the EU continued to grow in 2024, with the average number of mobile data subscriptions per 100 people (aged 16-74) across the EU reaching almost 90 %, compared to 86.5 % in 2023, and 5G coverage reaching 89.30 % of the households in the European Union, up from 81.26 % in 2023.

National differences do still exist, affected by geographical, historical and tax system variations from one country to another. However, the ongoing standardisation of regulatory practices contributes to bringing about a single European digital market. Regulations such as the Open Internet Regulation and Roaming Regulation, together with the new Gigabit Infrastructure Act, shine a light on the tangible contributions of the single European digital market to the well-being of businesses and individuals across Europe.

PART B: Annual Report on BEREC's activities in 2024

Annual Report on BEREC's activities in 2024, in accordance with Article 22 of Regulation (EU) 2018/1971 of the European Parliament and of the Council of 11 December 2018 establishing the Body of European Regulators for Electronic Communications (BEREC) and the Agency for Support for BEREC (BEREC Office).

1. Introduction

The activities of the Body of European Regulators for Electronic Communications (BEREC) in 2024 are presented in this Annual Report in accordance with Article 22 of the BEREC Regulation.

The Report focuses on the work streams and priorities set out in the BEREC Work Programme 2024 and reports on progress made therein during the year. Such work was mainly carried out by BEREC Working Groups (WGs). The final documents on the various accomplishments (among them, BEREC Guidelines, Opinions, Reports, and other documents) have been published after being approved by BEREC's Board of Regulators.

The objectives of BEREC's work in 2024 were aligned with the BEREC 2021–2025 Strategy, the three high level priorities (promoting full connectivity, supporting sustainable and open digital markets, empowering end-users), and the priorities set for institutional and international cooperation. In addition, facilitating the successful implementation and consistent application in all areas of the European Electronic Communications Code (EECC), the Open Internet Regulation and the Roaming Regulation, as well as Gigabit Infrastructure Act, are important cross-cutting themes within the strategic framework.

BEREC has also provided guidance to the co-legislators and the European Commission on a number of initiatives this year, such as those related to DDPP connectivity indicators.

BEREC has worked intensively on several essential tasks that have been entrusted to BEREC by the co-legislators, such as monitoring of the market and technological developments and their impact on how end-user rights apply and how the overall authorisation scheme functions.

Much of BEREC's work this year shifted from providing Guidelines on implementing the EECC to assess future technological and market developments in electronic communications and the digital ecosystem. Through its cooperation with other competent institutions and stakeholders, BEREC continuously ensures that future network technologies meet their connectivity targets in line with European values and interests (e.g. in relation to (cyber)security, the protection of end users, and environmental sustainability challenges).

Furthermore, BEREC has contributed to the implementation of the Digital Markets Act providing opinions on Meta's interoperability reference offers. BEREC has also contributed to discussions related to the future of telecoms regulation (EC White Paper: How to master Europe's digital infrastructure needs).

2. Work Programme 2024

2.1. Strategic priority 1: Promoting full connectivity

2.1.1. Draft Report on the regulation of physical infrastructure access

This draft report describes changes in regulation of physical infrastructure in the context of market analyses and will inform regulatory thinking on the need to access physical infrastructure to deploy fixed very high-capacity networks (VHCNs). The information is based on a comprehensive data-collection exercise carried out in mid-2024. Relevant information was collected from 29 countries across Europe, with a cut-off date of July 2024.

The document provides an overview of the means of access to physical infrastructure in Europe, irrespective of whether it is owned by telecommunications or non-telecommunications operators, as well as of the strategies used by electronic communications operators when expanding their networks and making use of physical infrastructure elements. Other topics presented in the document relate to how data is collated from non-telecommunications operators, how the physical infrastructure elements are treated in the market analyses and the corresponding remedies imposed when significant market power (SMP) operators are found, along with expectations for the future regarding physical infrastructure treatment. The draft report also includes considerations on the interplay between asymmetric and symmetric regulation in relation to access to physical infrastructure.

BEREC's research so far has shown that many NRAs regulated access to physical infrastructure through the SMP rules and so the importance of this regulatory tool, which allow for potential deregulation of other downstream markets. The asymmetric and symmetric regulatory regimes are seen broadly as complementary, with asymmetric rules used typically when stricter transparency or pricing obligations imposition was needed. NRAs have identified concerns about pricing heterogeneity for physical infrastructure elements.

At its 61st Board of Regulators meeting, BEREC approved this document for public consultation. Any interested third party could then submit contributions from 12 December 2024 to 19 February 2025. The final version of the report will be submitted for approval at the 63rd BEREC plenary meeting in June 2025.

Document:

BoR (24) 178: Draft BEREC Report on the regulation of physical infrastructure access

2.1.2. Workshops on the ex-ante regulatory experience of commitments, wholesale-only undertakings and commercial agreements review

The EECC introduced, with Article 76 on the Regulatory treatment of new very high capacity network (VHCN) elements, Article 79 on the Commitments procedure and Article 80 on Wholesale-only undertakings, the possibility to apply light-touch regulation in certain SMP situations with the aim of incentivising the deployment of VHCNs. Network access commitments and/or co-investment agreements may be made binding for the identified operators (deemed to have SMP) instead of imposing the full set of traditional remedies. In a similar vein, wholesale-only SMP operators may benefit from the imposition of only some (lighter) remedies if they fulfil certain criteria as provided in the EECC. At the same time, BEREC has been analysing the evolution of competition in certain markets that have been deregulated due to the adequate commercial agreements regarding network access concluded between operators.

In order to collect information on the NRAs' practices and to spur on the debate on the importance of these legal provisions, their efficacy in application, monitoring, evaluation and related guidance, BEREC ran two workshops covering the topic of ex-ante regulatory experience of commitments, wholesale-only undertakings and commercial agreements review.

On 11 April 2024, BEREC held a workshop with stakeholders in order to inform and report back on their experience of Articles 76, 79 and 80 in application, as well as on the commercial network access agreements negotiation process that ultimately led to the regulator's decision to lift the previous obligations in certain broadband markets. BEREC wanted to learn of procedural aspects, the main points of interest in the negotiations, any insights into the contractual clauses and to collect first-hand feedback from the industry.

On 18 September 2024, BEREC held an internal workshop for NRAs to share knowledge, expertise and relevant procedural aspects concerning the application of the said articles of the EECC, as well as the specific experience with deregulation based on commercial agreements. The internal discussion also reflected on the outcomes of the external workshop.

The findings of the workshops were important in shaping BEREC's thinking on whether to revise the Co-investment Guidelines and, more broadly still, will feed into the organization's reflections on how the EECC is working in practice.

Documents:

BoR (24) 83: Summary of the BEREC external Workshop on ex-ante regulatory experience concerning commitments, wholesale-only undertakings and commercial agreements review

BoR (24) 179: Summary of the BEREC internal Workshop on ex-ante regulatory experience concerning commitments, wholesale-only undertakings and commercial agreements review

2.1.3. Workshop on the design, enforcement and monitoring of remedies in sub-national markets with multiple SMP operators

On 18 June 2024, BEREC held an internal workshop to discuss possible regulatory approaches to setting remedies in a multi-SMP environment where different sub-national geographic markets have been identified. The NRAs that have already gained experience with such approaches made presentations, explaining how and why there was a need for the identification of several sub-national geographic markets with different SMP operators, and providing details on the design and, to some extent, differentiation of remedies imposed in such sub-national markets. During the workshop there were discussions on: (i) the reasons that led to a particular design of sub-nationally defined remedies, (ii) the factors that swung the balance in NRAs' decisions to follow the approach, (iii) the application and enforcement of remedies and (iv) insights resulting from permanent monitoring of remedies.

In a nutshell, the workshop was meant as a knowledge forum for exchange between NRAs and to contribute to the take-up of effective and coherent regulatory approaches to geographically segmented markets where there are multiple SMPs.

Document:

BoR (24) 141: Summary of the BEREC internal Workshop on the design, enforcement and monitoring of remedies in sub-national markets with multiple SMP operators

2.1.4. Progress Report on managing copper network switch-off

In the last few years, the topic of migration and copper switch-off has been a very strong focus for BEREC. Indeed, the topic has been the subject of five separate BEREC work streams since 2019.

Effectively managing migration and the copper switch-off is particularly important to safeguard competition and the rights of end users. The EECC sets out the expectation that NRAs should be able to monitor network operators' initiatives for the migration from legacy copper networks to VHCN and to facilitate this process by, where necessary, establishing the conditions for an appropriate migration process. The NRAs also have to take the new Gigabit Recommendation[19] into utmost account, including the recommendations for the decommissioning of the copper network. The Commission White Paper 'How to master Europe's digital infrastructure needs?' of February 2024 identifies the migration from legacy copper to newly deployed fibre networks as a key process in easing the transition to the new connectivity ecosystem and as a contribution to the EU's green objectives. At the same time,

[19] Commission Recommendation on the regulatory promotion of gigabit connectivity, C(2024) 523 final of 6.2.2024, see: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=PI_COM%3AC%282024%29523

the White Paper suggests that migration and the copper switch-off will encourage the take-up of new services and thus contribute to a better return on fibre investment and to meeting the Digital Decade targets[20].

Following BEREC (22) 69 report on a consistent approach to migration and copper switch-off, this report provides an update on the progress of copper switch-offs in Europe and a more detailed description and analysis of the rules set by the NRAs for the migration and switch-off process. It further describes practices that have proven to facilitate the migration and copper switch-off process and provides relevant lessons learnt in the most advanced countries, both on the process itself and how it is regulated. The report is based on a survey conducted in spring 2024 to which 31 European NRAs responded, including the 27 EU countries.

A public version of the draft report was available for public consultation from December 2024 to January 2025. The report is a carry-over deliverable to 2025 and the approval of the final report is envisaged for June 2025.

Document:

BoR (24) 181: BEREC Progress Report on managing copper network switch-off

2.1.5. Report on cloud and edge computing services

Cloud computing underpins most of the developments taking place in the digital sector. Its importance is set to grow even further in the coming years. Electronic Communication Network and Services (ECN/S) are part of the broad range of services that are evolving thanks to cloudification.

BEREC is of the opinion that its NRAs' experience in legislating is particularly valuable when addressing new emerging issues in the digital sector, including the expansion of cloud and edge services in the EU. This report aims to shed more light on the impact of these developments with a particular focus on the electronic communication sector, including thoughts on their regulatory implications. This analysis is intended to bring about better informed decisions, aimed at meeting the EU's political objectives of developing cloud and edge computing, including the investment and take-up targets set out in the EU Digital Decade Policy Programme 2030[21].

BEREC acknowledges the role that some of its NRAs are expected to play in implementing the EU's cloud and edge services legislation, such as the Data Act. This report could serve as

[20] Commission White Paper "How to master Europe's digital infrastructure needs?", COM (2024)81 final of 21.2.2024, see: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2024%3A81%3AFIN

[21] DECISION (EU) 2022/2481 of 14 December 2022 establishing the Digital Decade Policy Programme 2030.

comment on the enforcement of these powers and contribute to a uniform interpretation of the EU digital framework across the Member States.

With regard to ECN/S provision, cloud-based networks not only require more investment to enable new and enhanced services to emerge, as in previous network updates, they also entail a full sector transformation and major changes in the value chain. New roles, often undertaken by new suppliers, come into play for the provision of ECN/S and new complex competition and cooperation dynamics are taking place among these providers. Furthermore, ECN/S, Information Technology (IT) and cloud/edge computing services, sometimes including other elements such as Artificial Intelligence (AI) systems and Internet of Things (IoT) solutions, are increasingly being provided to the end users by means of fully integrated customised solutions. Overall, all these developments, both regarding the network architecture and the provision of the services to the users, imply that the boundaries between these services blur, leading to ECN/S and cloud/edge computing convergence. Those changes are to be closely followed by regulators.

BEREC rounds off its analysis by updating on the definitions and taxonomies of cloud and edge computing services put forward by the EU legislation and standardisation bodies.

The report outlines the risks and challenges the EU faces for a healthy expansion of cloud and edge services. Those challenges relate to the significant additional investment on infrastructure that those services require to flourish; concerns about market concentration and competition; digital sovereignty; sustainability; user uptake and development of use cases; interoperability; data protection and cybersecurity.

The EU aims to overcome these challenges by building a cloud environment that is: (i) interconnected (i.e., federated); (ii) interoperable; (iii) trusted; (iv) sustainable and (v) cloud-to-edge enabled (including infrastructures, platforms, marketplaces, services and testing and experimentation facilities for edge AI). In order to advance towards these objectives, the EU has put forward several initiatives and pieces of legislation. Among those, BEREC highlights the Digital Decade Policy Programme, the European Data Strategy, the Digital Markets Act and the Data Act.

The report goes on to expand upon cloud market characteristics, building on comprehensive analysis made by NRAs such as ACM and OFCOM and the French NCA. All of them reached similar conclusions and raised analogous competition concerns regarding concentration in a market characterised by economies of scale, ecosystems and network effects, switching and interoperability barriers as well as other constraints to entry and expansion.

Taking into consideration their relevance to fostering open and contestable markets, the report discusses the current levels of interoperability, standards and switching in the EU, including the barriers faced in switching data processing services and to the use of multi-clouds and the consequences that those barriers entail. BEREC welcomes the recent EU initiatives, in particular the Data Act, to encourage interoperability and standards and make it easier for consumers and businesses to switch.

The report describes how cloud and electronic communications interplay from four different angles. Firstly, the connectivity required to provide cloud and edge computing. Secondly, the migration of ECN to the cloud, considering the different elements and functions of the network (core, RAN edge, backhaul and transport, as well as network operation and orchestration). Thirdly, new and enhanced ECN/Ss by means of cloud-based network services (i.e., Network-as-a-Service). Lastly, supplying bundled and integrated ECN/S and IT services with cloud.

With this in mind, BEREC went on to consider the regulations around network cloudification. Specifically, it reflects on the definitions and scope of the EECC in view of the technology developments and convergent trends. It recognises the need to allow regulation to gain a broader view of the business ecosystems to be able to tackle emerging trends.

Competition implications regarding ECN/S and cloud/edge convergence are approached from four different angles: i) on ECN/S markets; ii) the impact on the cloud markets; iii) the partnerships between ECN/S and cloud providers and vi) the implications of ecosystems, including the risk of leveraging market power into adjacent markets.

BEREC points to Application Programmable Interfaces (API) openness as one of the key aspects in the process of ECN/S cloudification. It delves into the consequences of a lack of openness but also assesses the risks, such as discrimination or unfair behaviour, that API exposure might entail if not rightly implemented. It also considers other challenges related to net neutrality, data privacy and security.

The EECC sets NRAs and BEREC objectives on encouraging efficient investment and innovation in new and enhanced infrastructure while ensuring competition and non-discrimination. In this light, BEREC analyses the conditions and possible obstacles both regarding network upgrades towards cloudification and enabling the connectivity required for edge computing.

The report addresses the interplay among the different pieces of EU legislation impacting ECN/S and cloud/edge computing and the need to ensure that these are applied in a coherent and efficient manner, avoiding unnecessary red tape for the stakeholders. Similarly, it holds that the institutional set up should make regulatory enforcement easier. It is important that there is regulatory consistency and standardisation with coordination among all public bodies involved to safeguard this consistent approach, providing clear guidelines to users and providers to facilitate compliance and allow the necessary regulatory dialogue so that public enforcers can speak with a single voice. This will engender legal certainty, regulatory simplification and make public bodies more efficient in enforcing their policies.

In the last section, BEREC acknowledges the other regulatory issues that may arise in this field regarding digital sovereignty, the digital divide or environmental impact.

Some future trends are expected to be relevant in the upcoming years. It is likely that the market will continue growing. As IT resources increasingly move to the cloud and the market reaches further maturity, portability, switching and multi-cloud will become increasingly important. Cloud, IT and ECN/S follow a convergent trend. The ECN will evolve both to adapt to the provision of cloud services and by integrating some of its parts and functions into the

cloud. There may be an increase in the provision of services tailored to specific customers, integrating Cloud, IT and ECN/S elements. Partnerships among all players, with diverse and complementary expertise and experience in relation to these different elements will still be required in the medium term. Among those providers, *hyperscalers* are expected to continue holding a central position. Additional efforts on interoperability and seamless computing environments are to continue advancing.

Documents:

BoR (24) 52: Draft BEREC Report on Cloud and Edge Computing Services

BoR (24) 135: BEREC Report on the outcome of the public consultation on the draft BEREC Report on Cloud and Edge Computing Services

BoR (24) 136: BEREC Report on Cloud and Edge Computing Services

2.1.6. BEREC Report on the authorisation and related framework for international connectivity infrastructures (carry-over)

The Ministerial European Data Gateways Declaration, adopted by most European Union Member States in March 2021, highlights the fact that Europe's digital sovereignty and global competitiveness depend on strong and secure internal and external connectivity and that leveraging both of these is a precondition to the EU becoming 'the most attractive, most secure, and most dynamic data-agile economy in the world'.

With the BEREC Report on the general authorisation and related frameworks for international submarine connectivity, BEREC aimed to clarify the general authorisation and related frameworks applicable to international submarine connectivity and to identify ways to encourage investment in this sector and to strengthen the EU's geostrategic position.

This report:

- briefly describes the steps involved in the deployment and operation of submarine cable systems (Section 2);
- outlines how the electronic communications regulatory framework applies to international submarine cable systems and the powers and experience that the national regulatory authorities have in this field (Section 3);
- identifies other national administrative authorisation procedures applicable to international submarine cable systems (Section 4);
- gathers information on initiatives taken at European and national levels to promote international submarine connectivity (Section 5).

In this context and notwithstanding a recognition of the complexity involved in all other authorisation administrative procedures, caution was urged regarding any initiative that may unintentionally result in creating regulatory uncertainty or complexifying rather than simplifying authorisation procedures.

BEREC's conclusions on this matter.

- ECNS national legislations are applicable to the provision of an ECN or an ECS within the limits of the territory of each Member State. The extent to which they are applicable depends on the definitions of public ECNs and publicly available ECSs. These definitions are crucial for determining the regime applicable to each ECN or ECS, as most of the rights and obligations are applied solely to public ECNs and to publicly available ECSs.

- Despite its relevance, the EECC does not provide a definition of publicly available ECSs and, at a national level, there is currently no agreement on the definition – where one exists – and the interpretation of what qualifies as a publicly available ECS. This may cause regulatory uncertainty to a level that is seen by stakeholders as prejudicial to efficient investment in the business of submarine cable systems.

- Without prejudice to any case-by-case analysis, the traditional business models in which submarine cable systems are operated by ECNS providers to ensure the international capacity needed to support their retail business nationally and to sell on capacity to third parties at a wholesale and/or retail level would probably be qualified as public ECN and/or publicly available ECS.

- However, submarine cable systems operated by content and application providers connecting their data centres to exploit the capacity exclusively for their own use, without prejudice to a case-by-case analysis of all activities involved, could be qualified as non-public ECN and/or a non-publicly available ECS.

- Notwithstanding the fact that Europe is considered by stakeholders as a global leader for regulatory issues, the deployment of submarine cable systems depends on compliance with a significant number of national authorisation administrative procedures in fields beyond the ECNS sector, including environmental protection, cultural heritage protection, maritime resources planning and management and urban and territory planning and management, with time to authorisation potentially exceeding one year..

- Even though some countries have already created single points of contact and/or national cooperation mechanisms between competent authorities, this is still not a standardised policy across Europe. There is also a lack of international mechanisms or services, including points of contact at a European level, available to stakeholders interested in landing a submarine cable system in more than one European country.

- Existing measures to promote the expansion of international submarine connectivity include:

- at a European level, mostly financial support and, in 2024, the Recommendation on secure and resilient submarine cable infrastructures issued by the EC with a set of actions on authorisation administrative procedures and security and resilience; and

- at a national level, a varied and fragmented set of legal, administrative, institutional, security and financial measures.

- Worldwide responses to the public consultation recognised the EU institutional model as business-friendly and promising, deemed the general authorisation regime applicable to the electronic communications sector as worldwide best practice, and signalled an extensive group of measures that, in the stakeholders' eyes, have the potential to expedite the deployment of submarine cable systems and increase submarine connectivity. These measures are in the field of legal, administrative and institutional measures, in the field of security measures and in the field of financial measures.

As recently emphasised in BEREC's Action Plan 2030, BEREC continues to put an emphasis on advancing national and international connectivity and is planning to carry on a number of relevant projects addressing some strategic aspects of the national and EU-wide targets set by the EC in the Recommendation on secure and resilient submarine cable infrastructure and provide all relevant information and advice to the European institutions.

Documents:

BoR (24) 84: BEREC Report on the outcome of the public consultation on the draft BEREC Report on the general authorisation and related frameworks for international submarine connectivity

BoR (24) 85: BEREC Report on the general authorisation and related frameworks for international submarine connectivity

2.1.7. Report on Connectivity Indicators for the Digital Decade Policy Programme

Decision (EU) 2022/2481 of the European Parliament and of the Council (Decision) establishes the Digital Decade Policy Programme 2030 (DDPP) that it intended to guide Europe's digital transformation. It establishes digital targets and objectives in the realms of digital skills, digital infrastructure, digitalisation of business and of public services. Article 5(1) of the DDPP requires the EC to monitor Member States' progress towards the general objectives and the digital targets set out in the DDPP and, to that end, the EC is required to set out, by means of an implementing act, the KPIs for each digital target. On 30 June 2023 the Commission published the Implementing Decision setting out key performance indicators (among which the ones related to connectivity) to measure the progress towards the digital

targets established by Article 4(1) of Decision (EU) 2022/2481 of the EC and of the Council, C(2023)4288_final of 30 June 2023.[22]

This BEREC Implementation Report is looking in how the Decision and the Implementing Decision are implemented in practice by NRAs/OCAs with reference to connectivity KPIs and looks at the difficulties they encounter and at the results, they achieve.

This Implementation Report mainly shows the difficulties in collecting data for the KPIs to measure the progress towards the DDPP targets which are the result of various reasons. Naturally, the implementation of the DDPP KPIs as of any KPI system need some "warm-up" phase to cope with initial and unexpected issues when actually collecting and processing the data needed for the KPIs ("learning curve").

The process is more complex when some of the KPIs' definitions are missing or unclear and do not correspond to the information resources available at national level ("homes passed") and when some indicators are (overly) complex (e.g. 5G coverage per frequency band instead of a technological neutral way across bands). In these cases, many NRAs/OCAs are either not able to collect the data (at the required granularity) and, as a consequence, some "customize" the (missing/unclear) definitions that they can provide at least partially a result to the EC Consultants. Moreover, in a number of MS operators provide data directly to the EC Consultants – often without a possibility to verify it by the public authority, so that the data may be even less comparable.

Overall, given that the some of the data provided to the EC Consultant is patchy/missing/stems from various (unverified) sources, it is difficult to make robust comparisons of some indicators across MSs, (regarding comparability this is particularly true for expected peak time speed).

However, as already seen in the BEREC Art. 22 GS GL Implementation Report[23] BEREC sees progress in the comparability with reference to 2021[24] as many NRAs/OCAs nowadays use the Art. 22 GS GL for the collection and aggregation of the data. Also, the number of NRAs/OCAs reporting data directly (instead of operators submitting the data) to the EC Consultants has increased. Moreover, many of these authorities are now able to report the data at a more granular level (grid or address level instead of municipal and submunicipal level) and, therefore, need no assumptions for the aggregation, both resulting in a better level of data quality and more comparability of national results. But as shown in the previous

[22] EC Implementing Decision (EU) 2023/1353 of 30 June 2023, see: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=pi_com:C(2023)4288

[23] BoR (24) 146, Implementation report on the BEREC Guidelines on Geographical surveys of network deployments, 03.10.2024, see: https://www.berec.europa.eu/en/all-documents/berec/reports/implementation-report-on-the-berec-guidelines-on-geographical-surveys-of-network-deployments

[24] BoR (21) 172, BEREC Report to enable comparable national broadband coverage indicators throughout Europe, 09.12.2021, see: https://www.berec.europa.eu/en/document-categories/berec/reports/berec-report-to-enable-comparable-national-broadband-coverage-indicators-throughout-europe.

sections, BEREC has seen no progress over time in updating the definitions of homes passed and rural coverage.[25]

More generally, it is important that KPIs are defined in a way that they measure the objectives (in this case the progress towards the DDPP fixed and mobile connectivity targets), but are also proportional to the targets (i.e. do not make distinctions that are not needed to measure these targets) and simple to collect in practice as otherwise the comparability of the data across MSs will suffer because of incomplete results. Considering the complexities of the data collection processes and the uneven distribution of resources and experiences at national level, one should be able to tolerate some degree of non-comparability of figures while also expect it to diminish over time.

Thus, the trade-off between full accuracy and "good enough" should be decided case by case by assessing the benefit added by an extra level of accuracy vs. the costs of getting it in practice; in other words, "less is sometimes more" because, according to BEREC's and NRA experience, adding complexity to the indicators doesn't necessarily result in more comparability of the outcomes. In this regard, BEREC sees some progress, but also room for further improvement aiming simplifying NRA and OCAs practices in implementing KPIs. BEREC remains at the disposal of the EC for further work to deliver relevant and comparable connectivity indicators.

The results/conclusions of this Implementation Report will flow into both the update of the BEREC Art. 22 GS GL as well as BEREC's views on the EC's Methodology on 5G Mobile and Fixed QoS Coverage Mapping[26].

Document:
BoR (24) 187: Report on Connectivity Indicators for the Digital Decade Policy Programme

2.1.8. Implementation report on the BEREC Guidelines on Geographical surveys of network deployments

In the years, 2020 and 2021 BEREC published three "Guidelines on Geographical surveys" based on the mandate of Article 22 EECC regarding the mapping of broadband network deployments.
These Guidelines on Geographical surveys (GS) are:

[25] BoR (21) 172, BEREC Report to enable comparable national broadband coverage indicators throughout Europe, 09.12.2021, see: https://www.berec.europa.eu/en/document-categories/berec/reports/berec-report-to-enable-comparable-national-broadband-coverage-indicators-throughout-europe

[26] 1st Draft presented on 16th July 2024.

1. BEREC Guidelines on Geographical surveys of network deployments acc. to Article 22(1) EECC – the Core GL (GS I, BoR (20) 42 published in March 2020)[27];
2. BEREC Guidelines on Geographical surveys of network deployments acc. to Article 22(2) – Article 22(4) EECC – the GL on optional policies or the Procedural GL (GS II, BoR (21) 32 publ. in March 2021)[28];
3. BEREC Guidelines on Geographical surveys of network deployments – Verification of information acc. to Art.icle22(1) EECC – the Verification GL (GS III, BoR (21) 82 publ. in June 2021)[29].

In point 1.5 (Guidelines Revision) of the Core Guidelines, BEREC commits itself to prepare an Implementation Report "to examine how different Member States have transposed and enabled the Article 22 provisions. Following the Implementation Report BEREC will consider revising and updating the Guidelines".[30]

BEREC is publishing this Implementation Report, which gathers evidence about the extent to which the Article 22 EECC provisions and the BEREC Guidelines have been followed by authorities and how. This information should enable BEREC to judge the usefulness of its Guidelines to conduct the GS and to implement consistently the Article 22 provisions, identify any lessons learnt, detect areas for improvement and, finally, consider whether BEREC should programme a partial or more substantive update of its Guidelines in 2025.

This implementation report has shown that overall Article 22 EECC and the BEREC Guidelines have contributed to a substantially increasing number of GS across the EU and improving their granularity and the quantity and breadth of information retrieved. At the time of drafting the BEREC Guidelines, many countries collected no geographical information or information which was not sufficiently granular, and the use of Geographical Information Systems (GIS) was not widespread. In contrast, today all MS collect very granular information and all NRAs/OCAs use GIS. The BEREC Guidelines have also improved the comparability across national outcomes, especially for fixed wired networks and coverage information, since the definition of "premises passed" has been almost unanimously adopted and information is collected at a very granular level, so that there are no problems of data aggregation in producing national or regional connectivity statistics.

[27] https://berec.europa.eu/eng/document_register/subject_matter/berec/regulatory_best_practices/guidelines/9027-berec-guidelines-to-assist-nras-on-the-consistent-application-of-geographical-surveys-of-network-deployments

[28] https://berec.europa.eu/eng/document_register/subject_matter/berec/download/0/9884-berec-guidelines-on-geographical-surveys_0.pdf

[29] https://berec.europa.eu/eng/document_register/subject_matter/berec/download/0/9980-berec-guidelines-on-geographical-surveys_0.pdf

[30] BoR (20) 42, BEREC Guidelines to assist NRAs on the consistent application of Geographical surveys of network deployments, 05.03.2020, see: https://www.berec.europa.eu/en/document-categories/berec/regulatory-best-practices/guidelines/berec-guidelines-to-assist-nras-on-the-consistent-application-of-geographical-surveys-of-network-deployments

Hence, overall, it can be concluded that the BEREC Guidelines and the NRAs/OCAs efforts in implementing these guidelines have resulted in a very solid foundation for a harmonized delivery of GS in European countries.

However, MS experience important problems in collecting QoS information at a sufficiently granular level and expected peak time speed plays out as a specially challenging indicator. More could be done to assist authorities regarding the QoS indicators in general and for Fixed Wireless Access (FWA). Also, BEREC needs to think about the information to characterise mobile networks as the harmonization of the coverage calculations of 5G networks by the various NRA/OCA seems to be quite challenging. Indeed, the approaches adopted by the NRA/OCA could be very different, since the collections are mostly based on the distinction between 5G SA and 5G NSA, but also other distinctions (based on frequencies or BTS characteristics) are used.

BEREC Guidelines provided a first step towards a better mapping of broadband networks, but in the light of:

- Technology developments
- More recent BEREC documents, in particular the VHCN GL[31]
- New EU legislation, in particular the Gigabit Infrastructure Act (GIA)[32]
- A multitude of more recent EU and EC soft law documents such as the Annex I in the EU State Aid Guidelines mapping[33] and measurement of the Digital Decade Key Performance Indicators[34].

BEREC considers it appropriate to update the BEREC Guidelines on Art. 22 broadband mapping. In particular, the existence of several more recently introduced broadband mapping methodologies that partly overlap can cause confusion for operators and authorities, a situation that should be avoided. Also, as this implementation report has shown there is room for improvement regarding the approaches to implement the Guidelines to achieve further harmonization and with this increase the comparability across MS.

BEREC will work on the update once the outcome of the EC “Methodology on 5G Mobile and Fixed QoS Coverage Mapping” is known, most likely in the second half of 2025.

[31] BoR (20) 165 and an updated version related to mobile VHCN BoR (23) 164; currently the VHCN GL are updated with regard to fixed VHCN.

[32] Regulation (EU) 2024/1309 of 29 April 2024 replacing the BCRD.

[33] See Annex I in Communication From The Commission Guidelines on State aid for broadband networks 2023/C 36/01 available at EUR-Lex - 52023XC0131(01) - EN - EUR-Lex (europa.eu).

[34] See Implementing decision setting out key performance indicators to measure the progress towards the digital targets | Shaping Europe’s digital future (europa.eu) of 30 June 2023 (C(2023)4288_final).

Document:

BoR (24) 146: Implementation report on the BEREC Guidelines on Geographical surveys of network deployments

2.1.9. External workshop on technological advances as security opportunities and challenges for network resilience

The BEREC Cybersecurity Working Group ran a Stakeholder Workshop on Network Resilience on 19 November 2024, which aimed to raise awareness of current resilience and security-related challenges among NRAs, operators, and other stakeholders, and to share experiences and best practice.

The workshop was divided into two panels: 'National Perspectives on Resilience and Coordination' and 'Solutions for Resilience'. The first panel covered three country case studies from Iceland, Norway and the United Kingdom, while the second panel presented solutions from operators such as A1 Slovenija, Vodafone Group, ASTRID Blue Light Mobile and the European Emergency Number Association (EENA).

The workshop presentations highlighted the importance of network resilience in the face of increasingly complex risks, including natural disasters, cyber-attacks and technological transitions. They emphasised the need for robust network design, component verification, efficient procedures and training, and stakeholder communication to ensure the availability and reliability of emergency services.

Representatives of ENISA, the EU Agency for Cybersecurity, provided an overview of their work to build up cybersecurity and resilience in the EU's telecom sector, including its efforts to promote the use of satellite systems, protect submarine cables, and develop multivendor strategies and security approaches. In conclusion, the workshop highlighted the importance of network resilience to safeguard the availability and reliability of emergency services and the need for robust network design, component verification, efficient procedures and training, and stakeholder communication. It also emphasised the importance of international cooperation and information sharing to address the complex challenges facing the telecom sector.

Document:

Workshop Summary Report to be adopted at first plenary meeting of 2025

2.1.10. BEREC Report on the evolution of private and public 5G networks in Europe

The Board of Regulators approved the 'Draft BEREC Report on the evolution of private and public 5G networks in Europe'[35] for public consultation at the 60th BEREC Plenary meeting (3 October 2024). This draft report sets out BEREC's preliminary views on the current status, needs and regulatory issues surrounding the implementation of private 5G networks in Europe from the perspective of national regulatory authorities. BEREC's views are predominantly based on an internal survey to NRAs, which highlights that few dedicated frameworks for private networks had been implemented by the date the data was collected (April 2024), and those are designed to meet specific needs in countries.

There are many configurations and architectures of private mobile networks, from the isolated standalone private networks to public network-integrated private networks in the form of a private slice of a public 5G network. The 3400-4200 MHz frequency range is the most common band for private 5G networks in Europe. Based on the results of the NRA survey, the ability of BEREC to extract information on specific drivers for private networks was limited. For example, it was not clear if the driver was the technical features of 3GPP-based private networks or a cost efficiency reason arising from implementing a private network in business operations, or a combination of these two reasons and others. In BEREC's view, it is very likely that a significant share of the private networks being deployed in countries is not known to NRAs because of the different classifications and registrations used by NRAs. For instance, in many cases Mobile Network Operators (MNOs) can deploy private networks without the need to register them as private networks, while other companies deploy standalone private networks using (leased) MNO spectrum (in many cases also without needing a specific registration for the use of that spectrum), or other cases where there is no obligation to separately register certain types of private network. As a result, potential difficulties faced by private network providers which regulation might address may go unnoticed. BEREC is also aware that EU Member States are taking different approaches regarding numbering and spectrum issues, but the intention of the European Commission (through the Radio Spectrum Committee) to standardise dedicated radio frequency ranges for private networks will assist technical spectrum harmonisation.

From 8 October to 29 November 2024, stakeholders were invited to comment on any of the material presented in the draft report, as well as being asked to provide feedback on the consultation questions on numbering, drivers and use cases raised in chapters 3 and 4 in the draft report.

[35] BoR (24) 150, Draft BEREC Report on the evolution of private and public 5G networks in Europe, 03.10.2024, see: https://berec.europa.eu/en/all-documents/berec/reports/draft-berec-report-on-the-evolution-of-private-and-public-5g-networks-in-europe

During the public consultation, BEREC received 20 contributions. The final report is expected to be discussed at the 62nd Plenary Meeting on 13 March 2025 and then approved for publication.

Document:
BoR (24) 150: Draft BEREC Report on the Evolution of Private and Public 5G Networks in Europe

2.1.11. External workshop about the usage of satellite technologies in mobile communications

On 22 May 2024, BEREC held a hybrid workshop at the Bundesnetzagentur (BNetzA) office in Mainz, Germany to explore the emerging trends in satellite communication and direct-to-device non-terrestrial networks. It was a very well-attended event with 350 participants from various stakeholder groups: eight from equipment vendors, 215 regulators/policymakers/government representatives, 27 from the satellite operator industry, 46 wireless / fixed operators, and 54 participants from other stakeholder groups (e.g. think tanks, consumer groups/broadcast/consultancy/media, etc.). The non-confidential slides from the workshop have been published on the BEREC website[36].

BEREC based its workshop on previous relevant studies and reports. In particular, the [37] was an important building block, as BEREC concluded that satellite communications (SatCom) can be an integral part of providing connectivity to remote locations where terrestrial networks are unable to reach and/or serve populations cheaply. In addition, this workshop built on earlier insights from another workshop on secure and reliable connectivity from low earth orbit ('LEO') satellite fleets[38] held in 2023.

The goal of the 2024 hybrid external workshop was to equip BEREC and the NRAs with a better understanding of relevant trends in Satellite Communication and potential opportunities and challenges. In particular, the focus of the workshop was on the potential regulatory issues associated with Non Terrestrial Networks ('NTNs') when expanding mobile/fixed communication networks; issues such as roaming, handovers, numbering, interoperability and

[36] BEREC external workshop about the usage of satellite technologies in mobile communications, see: https://www.berec.europa.eu/en/events/berec-external-workshop-about-the-usage-of-satellite-technologies-in-mobile-communications

[37] BoR (22) 169, Report on satellite connectivity for universal service, 12.12.2022, see: https://www.berec.europa.eu/en/document-categories/berec/reports/report-on-satellite-connectivity-for-universal-service

[38] BoR (23) 112, Summary report: BEREC workshop on secure and reliable connectivity from LEO satellite fleets, 13 April 2023, 08.06.2023, see: https://www.berec.europa.eu/en/document-categories/berec/reports/summary-report-berec-workshop-on-secure-and-reliable-connectivity-from-leo-satellite-fleets-13-april-2023

non-discrimination, market access and authorisations, lawful interception, emergency calls, competition, consumer security and environmental sustainability.

The workshop consisted of several sessions, which included interactive discussions between the speakers and the audience. The sessions were:

- Opening statements (from high-level representatives from relevant associations and the host, BNetzA);
- Status of Non-Terrestrial Networks and introduction to today's regulatory challenges;
- Deeper dive into market access trends and the direct-to-device ecosystems;
- Future opportunities and challenges; and
- Closing remarks by the BEREC working group co-chairs.

BEREC's next steps will fall under the BEREC Work Programme 2025. In 2025, BEREC will hold an internal workshop to explore direct-to-mobile device satellite connectivity trends and options, potentially with experts from a number of selected peer institutions like RSPG and ENISA.

Document:

BoR (24) 151: BEREC Summary Report on BEREC WS Satellite technologies in mobile communications

2.1.12. Update of criterion 3 of the BEREC Guidelines on very high capacity networks

The BEREC Guidelines on very high capacity networks (BoR (20) 165, paragraph 18) set out four criteria and any network that meets at least one of these criteria is considered to be a very high capacity network. Criteria 1 and 2 result directly from the definition of the term 'very high capacity network' in the EECC (Article 2(2)), while criteria 3 and 4 are also based on data collected from network operators. Criteria 3 and 4 state that any network providing a fixed-line (criterion 3) or wireless connection (criterion 4) that is capable of delivering, under usual peak-time conditions, services to end users with a specified quality of service (performance thresholds for criterion 3 or 4) is considered to be a very high capacity network.

According to Article 82 of the EECC, 'BEREC shall update the guidelines by 31 December 2025, and regularly thereafter'. BEREC already updated criterion 4 in 2023 (BoR (23) 164) and criteria 1 and 2 do not need to be updated as they do not depend on technological developments. The objective of this project is to review criterion 3, based on data from fixed network operators. To that end, data collection questionnaires were updated to include more advanced access technologies (e.g. MG.fast, DOCSIS 4.0) than were available in 2020. Two comprehensive questionnaires (Questionnaire 1 – Questionnaire for fixed network operators with fibre to the building (FTTB) and in-building copper twisted pair and Questionnaire 2 – Questionnaire for operators of a hybrid fibre coax (HFC) network with fibre rolled out up to the

building) were sent to fixed network operators in April 2024. Over a period of 8 weeks, more than 105 responses were received and analysed in detail.

In 2025, BEREC will continue its work on this Update of criterion 3 of the BEREC Guidelines on very high capacity networks that will be subject to a public consultation after the first plenary meeting of 2025. The final updated guidelines are expected to be approved in December 2025.

Document:
Updated Guidelines to be adopted in 2025

2.2. Strategic priority 2: Thriving sustainable and open digital markets

2.2.1. Report on the implementation of the Open Internet Regulation and the BEREC Open Internet Guidelines

In October 2024, BEREC published its annual report on the implementation of the Open Internet Regulation (OIR) (Regulation (EU) 2015/2120). This report provided a comprehensive overview of the activities undertaken by NRAs in enforcing the OIR and adhering to the associated BEREC Open Internet Guidelines. The 2024 report marked the eighth year of the OIR's application, covering the period from 1 May 2023 to 30 April 2024.

To compile the report, BEREC collected information from 29 NRAs via an internal questionnaire. This data was further supplemented with publicly available information on open internet cases or investigations conducted during the reporting period.

For this year, the internal questionnaire was revised, reducing the number of questions from 31 to 27 and refining the clarity of specific queries. Consequently, the report was restructured and adjusted to accommodate these changes.

An internal workshop was held to examine the use of DNS-blocking under Article 3(3)(b) of the OIR. This initiative was designed to allow NRAs to exchange information and featured presentations by invited experts. The workshop was deemed particularly relevant due to the rising frequency of security threats such as phishing and cyberattacks.

Over the course of 2024, BEREC also provided a forum for NRAs to share information so as to facilitate the consistent application of the OIR.

Document:
BoR (24) 134: BEREC Report on the implementation of the Open Internet Regulation

2.2.2. Collaboration on internet access service measurement tools

In 2024, BEREC members continued to share their experiences of IAS quality measurement tools in order to develop these further. The relevant working group provided a forum for the exchange of best practice.

2.2.3. External workshop on the perspectives and regulatory/competition challenges of the Internet of Things

In 2016, BEREC prepared a Report on Enabling the Internet of Things (IoT). In it, BEREC concluded that, in general, no special treatment of IoT services and/or Machine-to-Machine (M2M) communication is necessary, except for the following areas: roaming, switching and number portability.

On 26 October 2023, BEREC ran an online workshop on the Internet of Things: perspectives and competition. It was to assess the state of the art for the delivery of IoT services, their evolution in recent years in view of new technology and any regulatory developments. Participants discussed whether new competition or provisioning bottlenecks had arisen or if the issues identified in 2016 had been resolved.

About 150 participants, representing BEREC members and different types of stakeholders, took part in the event. This report summarised the main ideas shared during the workshop. The main topics and takeaways from the workshop are as follows:

BEREC Chair 2023, Prof. Kostas Masselos, provided the keynote speech. He underlined the great interest to BEREC in discussing this crucial topic with the stakeholders. In particular, he highlighted the main issues for IoT development as quality of service (QoS), handover and network slicing.

The first panel was on IoT solutions. The panellists provided their respective views on the IoT, stressing the importance of safety and regulation of services, together with having a strong consideration for differences across industry segments when developing any regulatory approach.

Main points on the next panel were given to the global perspective of the IoT services. Having pan-European network access and permanent roaming would facilitate its development. Current regulation was described as adequate though some room for improvement exists, such as updating the definition of short-range devices to comply with changes in IoT use. In relation to satellite services, the secondary use of MNOs' frequencies by satellite services could have an indirect impact on price in spectrum auctions.

Mr Stuckmann, Head of the Electronic Communications Policy, Implementation and Enforcement Unit at the EC provided the closing remarks of the workshop. He spoke of the relevance of the IoT from the policy perspective in the context of a twin transition, meaning both a digital and a green transition, and the digitalization of society.

Final remarks by the Co-Chairs were connecting all those conclusions with the context of the External workshop about the use of satellite technologies in mobile communications and the Report on M2M and permanent roaming included in the 2024 BEREC work programme[39].

Document:

BoR (24) 37: BEREC Summary Report of the Workshop on Internet of Things: Perspectives and Competition

2.2.4. BEREC Report on the IP interconnection ecosystem (carry-over)

The topic of IP interconnection (IP-IC) has gained significant momentum in recent years. In 2024, BEREC published the BEREC Report on the IP Interconnection Ecosystem. Re-evaluating its previous findings on the subject published in 2012 and 2017, the report enabled BEREC to enhance its understanding on the subject and provide informed insights into this debate.

In particular, the Report on the IP Interconnection Ecosystem reassesses the conclusions drawn in 2017 and provides a detailed analysis of the current status of IP-IC in Europe and market developments since the previous reports. While the scope of the report is confined to the IP-IC ecosystem, it acknowledges some overlap with the ongoing debate concerning payments from large Content and Application Providers (CAPs) to Internet Access Service (IAS) providers. However, the report does not seek to replicate this specific discussion. The analysis spans the period from early 2017 to autumn 2023 and includes projections for likely trends up to 2030, where objective data is available.

A draft of the updated report was made available for public consultation from 11 June to 1st August 2024. During this period, BEREC received 36 responses from various stakeholders. Of these, 31 contributions were published, while five submissions were marked confidential. One stakeholder provided both public and confidential versions, and one submission received after the deadline was excluded from consideration. In line with its policy on public consultations, BEREC published in December 2024 a summary of all contributions, respecting confidentiality requests. These contributions are accessible on BEREC's Public Register, adhering to confidentiality and personal data protection requirements.

Building upon insights gained from workshops conducted in the autumn of 2023, BEREC disseminated an ad hoc questionnaire to a broad range of stakeholders in May 2024. The

[39]BoR (23) 210, BEREC Work Programme 2024, 07.12.2023, see: https://www.berec.europa.eu/en/document-categories/berec/berec-strategies-and-work-programmes/berec-work-programme-2024

questionnaire elicited responses from 130 stakeholders, including Tier 1 providers, CAPs, content delivery network (CDN) providers, and IAS providers.

The main body of the report, published in December 2024, excludes the results of the ad hoc questionnaire. However, a summary of these findings is included in an internal annex, intended for in-house use only.

BEREC considers that the IP-IC ecosystem is driven by functioning market dynamics and by the cooperative behaviour of market players. Despite this, BEREC is aware that some IP-IC disputes have occurred since 2017. These disputes are seemingly motivated by some incumbent IAS providers' attempting to strategically leverage their termination monopoly to obtain (higher) compensation for IP-IC from CAPs. BEREC notes that stakeholders typically did not call for regulation but suggested monitoring and a case-by-case assessment. Consistent with BEREC's guidelines on the OIR, BEREC observes that IP-IC practices cannot be used to circumvent the OIR and that competent authorities are empowered to intervene in these types of situations as well as following a case-specific examination.

Documents:

BoR (24) 176: BEREC Report on the outcome of the public consultation on the draft report on the IP Interconnection ecosystem

BoR (24) 177: BEREC Report on the IP Interconnection ecosystem

Internal Annex to the Report on the IP-IC ecosystem

2.2.5. BEREC Report on the entry of large content and application providers into the markets for electronic communications networks and services (carry-over)

Building on the conclusions of the BEREC Report on the Internet Ecosystem (BoR (22) 167)[40], this Report gives an overview of the impact of large CAPs on the markets for ECN and ECS in Europe by presenting their strategies, business models, and relations with traditional ECN/ECS providers in terms of competition, cooperation and interdependence.

In order to better analyse the implications of the CAPs' presence and strategies in ECS/ECN markets, BEREC carried out three case studies focusing on CDNs, submarine cables and internet relay services[41]. The report highlights some potential restrictions that may be imposed by operating systems providers on ECN/ECS operators. BEREC's analysis stresses how large

[40] BoR (22) 167, BEREC Report on the Internet Ecosystem, 12.12.2022, see: https://www.berec.europa.eu/en/document-categories/berec/reports/berec-report-on-the-internet-ecosystem

[41] This selection is not meant to exhaustively represent CAPs' presence and strategies in ECS/ECN markets.

CAPs insource what was formerly purchased from traditional ECN/ECS providers to a large degree. Indeed, large CAPs have deployed their own physical infrastructure, such as CDNs and data centres, as well as network infrastructure, such as submarine cables. By building their own large autonomous systems, they rely significantly less, or not at all, on the long-distance transit provided by ECN/ECS operators.

In order to gather relevant feedback and insight, BEREC circulated a detailed questionnaire to seven large CAPs and two major traditional commercial CDN providers and held a workshop on 21 September 2023 on international submarine connectivity in the European Union[42]. At the workshop, private stakeholders (both traditional ECN/ECS providers and large CAPs) and the EC shared their views on the current state of play of the international submarine connectivity business in the European Union. The workshop focused on the dynamics following the entry of new competitors, the challenges faced, and the expectations on the evolution of the European and national regulatory framework and institutional organisation and public policies in this area. In addition, BEREC also organised internal workshops to gather specific insight from selected stakeholders on a range of topics addressed in this report.

Furthermore, this report also includes the contributions, comments and insights garnered during the public consultation on its first draft[43]. In total, 18 stakeholders provided their contributions that were then summarised and presented in the public consultation report.

Documents:

BoR (24) 139: BEREC Report on the entry of large content and application providers into the markets for electronic communications networks and services

BoR (24) 138: BEREC Report on the outcome of the public consultation on the Draft BEREC Report on the entry of large content and application providers into the markets for electronic communications networks and services

[42] BEREC Workshop on international submarine connectivity in the EU, 21.09.2021, see: https://www.berec.europa.eu/en/events/berec-workshop-on-international-submarine-connectivity-in-the-eu

[43] The draft BEREC Report on the entry of large content and application providers into the markets for electronic communications networks and services (BoR(24)51) was opened to public consultations from 13 March to 24 April. BEREC Report on the outcome of the Public consultation on the Draft BEREC Report on the entry of large content and application providers into the markets for electronic communications networks and services (BoR(24)138) explains how these contributions were integrated in the current report, 03.10.2024, see: https://berec.europa.eu/en/all-documents/berec/reports/berec-report-on-the-outcome-of-the-public-consultation-on-the-draft-berec-report-on-the-entry-of-large-content-and-application-providers-into-the-markets-for-electronic-communications-networks-and-services

2.2.6. BEREC Report on Infrastructure-sharing as a lever for ECN/ECS environmental sustainability

Infrastructure sharing in the telecommunications sector, which includes passive (e.g., towers and ducts) and active sharing (e.g. transmission equipment and antennas), has the potential to reduce environmental impact through decreased infrastructure duplication, energy conservation and reduced material consumption. By consolidating physical assets and technology, shared infrastructure can significantly lower carbon emissions, land use and use of resources. These environmental gains also address energy consumption, raw materials usage and electronic waste, creating a positive contribution to the environmental footprint of ECNs and ECSs.

This report explores infrastructure sharing as a lever for environmental sustainability in ECNs and ECSs, aligning with broader EU objectives to reduce the ICT sector's environmental impact. As a response to the EU Green Deal and the UN Agenda 2030, BEREC examines how regulatory tools might enhance the environmental performance of telecommunications by minimising the footprint associated with network deployment and operation. It capitalises on previous publications from BEREC on infrastructure sharing and bases its analysis on a survey circulated among NRAs within BEREC and on a consultation of stakeholders at a technical workshop.

This report is a carry-over deliverable to 2025. The public consultation was open until 31 January 2025. The final report is to be approved at Plenary 2, 2025.

Document:
BoR (24) 186: Draft Report on Infrastructure Sharing as a lever for ECN/ECS Environmental Sustainability

2.2.7. BEREC internal workshop on telecom regulators' role in the development and implementation of sustainability indicators in the ICT sector

The European Green Deal has set ambitious targets to encourage sustainability in the ICT sector, emphasising transparency measures for electronic communications. Since 2020, BEREC has integrated sustainability into its strategy, focusing on enhancing environmental transparency and defining robust indicators to monitor the environmental footprint of ECNs/ECSs. In 2023, BEREC published a report on sustainability indicators based on internal research, stakeholder workshops, and feedback from 81 companies and 29 NRAs and public bodies to improve data availability and reliability and help the various stakeholders understand the environmental impact of electronic communications.

In 2024, BEREC continued to support the EC's goal of increased environmental transparency for digital infrastructure, contributing to a Code of Conduct on sustainability for telecommunications networks and services. On 11 September 2024, BEREC ran a workshop

in Belgrade, Serbia, to discuss the role of telecom regulators in supporting environmental transparency.

The workshop featured presentations from key figures, including Tomas Lamanauskas from the ITU, academic experts' Dr Kelly Widdicks and Prof Adrian Friday, and representatives from the EC. The event concluded with discussions on how telecom regulators can implement standardised and reliable sustainability indicators for electronic communications networks.

Document:

BoR (24) 167: Summary Report on BEREC internal workshop "Telecom regulators' role in the development and implementation of sustainability indicators in the ICT sector"

2.2.8. BEREC internal workshop on the implementation of the Digital Services Act

On 30 October 2024 BEREC held an internal workshop to discuss the implementation of the Digital Services Act (DSA). The different Digital Services Coordinators (DSCs) who are members of BEREC shared their first insights and early experiences on the practical implementation of the DSA at different levels. The workshop was constructed around the following topics: the DSCs' internal organisation and resources; the cooperation models at national level; the certification process for entities (from the definition of the criteria to the assessment); and identifying and updating the intermediary services providers.

2.2.9. BEREC's contribution to the implementation of the Data Act

BEREC is maintaining its close collaboration with the EC in order to clarify the remaining uncertainties on the practical implementation of the Data Act. BEREC closely engaged with the EC to discuss the implementation and interpretation of the Data Act, with the aim of providing legal clarity around data access, sharing and use, facilitating data flows, and promoting standards and interoperability, with a focus on switching cloud providers and the importance of legal, organisational and technical (e.g. cybersecurity) safeguards.

The meetings among BEREC members covered several topics with the purpose of building common knowledge and sharing early feedback on the Data Act around data egress and switching charges; specifications for the essential requirements regarding data interoperability, data portability and open interfaces; the implications for the competent authorities; and cooperation at national and European levels.

2.3. Strategic priority 3: Empowering end users

2.3.1. BEREC Report on the Member States' best practice to support the defining of adequate broadband Internet Access Service (IAS) (carry-over)

The EECC includes the provision of an adequate broadband access, including the underlying connection at a fixed location, within the scope of the universal service. In accordance with Article 84 of the EECC, each Member State is required to define what constitutes adequate broadband for its jurisdiction, given national conditions and the minimum bandwidth enjoyed by the majority of consumers, with a view to ensuring the bandwidth necessary to actively participate in society socially and economically. BEREC has been asked 'to contribute towards a consistent application of this Article' and 'after consulting stakeholders and in close cooperation with the Commission, taking into account available Commission (Eurostat) data, draw up a report on Member States' best practices to support the defining of adequate broadband internet access service […].' The adequate broadband internet access service must be capable of delivering the bandwidth necessary to carry at least the minimum set of services set out in Annex V of the EECC. It should also be noted that Article 86 of the EECC on the availability of universal service refers to the adequate broadband internet access service, as defined in accordance with Article 84(3) of the EECC.

In 2020, BEREC published its first report on Member States' best practices to support the defining of adequate broadband internet access service (document reference BoR (20) 99). Article 84(3) of the EECC states that the report shall be updated regularly to reflect technological advances and changes in consumer usage patterns. The minimum set of services that the adequate broadband internet access service must be capable of supporting is outlined in Annex V of the EECC.

The report covers the following:

- The policy principle – Article 84 of the EECC;
    - Relevant experience that BEREC can focus on;
- The concept of adequate broadband in the context of universal service (definition, methodology used in defining the adequate broadband internet access service, obligations, funding, monitoring, and compliance);
- Challenges raised by Members States;
    - Conclusions.

The report has been drafted in close cooperation with the EC, especially with regard to the data sources referenced in the report. While the previous report (BoR (20) 99) offered insight into the practices of nine Member States that had introduced broadband under a universal service obligation (USO) prior to the transposition of the EECC, this report now provides the

observations on the adequate broadband internet access service (as part of universal service) across 29 Member States that responded to the May 2023 questionnaire.

Summary of the main findings from the 29 responses BEREC received.

- Regarding the obligations and designation processes, only nine Member States designated service providers to ensure universal service, including an adequate broadband internet access service, at a local or national level. A total of ten Member States have imposed obligations (nine plus Portugal, where national legislation requires providers offer the minimum adequate Internet access, as long as there is available infrastructure and/or mobile coverage). The majority of the Member States stated that they haven't imposed obligations or do not intend to consider imposing obligations.

- The data speed Member States set down has evolved significantly since the previous BEREC report (BoR (20) 99). The most common definition of the minimum download speed is 10 Mbps. However, some countries have set, or are planning to set, 30 Mbps as the minimum download speed. In addition to Malta and the Netherlands, which have already set it at 30 Mbps, Belgium, Luxembourg and Spain are also considering the same data speed.

- Monitoring of universal service is mostly delegated to NRAs (in 20 of the 29 Member States that responded). However, a few Member States do not carry out monitoring.

- Funding for the universal service varies across Member States, with an industry funding mechanism being the most common.

Recent developments and increasing need by end users for adequate broadband, especially during the COVID-19 pandemic (i.e. the challenge of digitised healthcare, etc.) indicate that the minimum set of services, to be enjoyed by the majority of end –users, set out in Annex V of the EECC should be further assessed.

This report was subject to public consultation in October-November 2023.

This report is a best practice report, and it does not aim to provide formal universal service implementation guidance in respect of the EECC. According to Article 84 of the EECC, it is for the Member State, using this BEREC report on best practice, to set adequate broadband internet access levels appropriate to national conditions and the minimum bandwidth enjoyed by the majority of consumers within that territory to ensure an adequate level of social inclusion and participation in the digital economy and society in said territory.

Documents:

BoR (24) 39: BEREC Summary report on the outcome of the public consultation on the draft BEREC Report on Member States' best practices to support the defining of adequate broadband internet access service

BoR (24) 40: BEREC Report on Member States' best practices to support the defining of adequate broadband internet access service

2.3.2. BEREC Guidelines detailing Quality of Service (QoS) parameters (carry-over)

According to Article 104 of the EECC, NRAs – in coordination with other competent authorities – may require providers of Internet access services (IAS) and of publicly available interpersonal communications services (ICS) to publish comprehensive, comparable, reliable, user-friendly and up-to-date information for end users on the quality of their services and on measures taken to ensure fair and equal access for end users with disabilities.

NRAs, in coordination with other competent authorities, must also specify, with particular regard to BEREC guidelines, the QoS parameters to be measured, the applicable measurement methods and the content, form and manner of the information to be published, including any quality certification mechanisms.

In 2020, BEREC published the first guidelines detailing QoS parameters (BoR (20) 53[44]). The guidelines stated that the process of undertaking a review will commence two years from the adoption and publication of the guidelines by BEREC.

The purpose of this project was to prepare and publish the first review of the guidelines detailing QoS parameters.

The project addressed the constituent elements of the legislative task assigned to BEREC, including:

- the relevant QoS parameters in relation to ICS and IAS;
- the parameters relevant for end users with disabilities;
- the applicable measurement methods for QoS parameters including, where appropriate, the ETSI and ITU standards set out in Annex X to the EECC in relation to ICS and IAS respectively;
- the content and format of QoS information;
- the quality certification mechanisms.

[44] BoR (20) 53, BEREC Guidelines detailing Quality of Service Parameters, 06.03.2020, see: https://www.berec.europa.eu/en/document-categories/berec/regulatory-best-practices/guidelines/berec-guidelines-detailing-quality-of-service-parameters-0

BEREC adopted a Draft report on Guidelines detailing Quality of Service (QoS) parameters for public consultation.

The public consultation ran from 10 October to 10 November 2023 with the objective to gather stakeholders' comments and observations on the content of the draft BEREC Guidelines.

The BEREC Guidelines detailing Quality of Service Parameters contain the QoS parameters to be measured, the applicable measurement methods and the content, form and manner of the information to be published, including possible quality certification mechanisms which relevant stakeholders and NRAs, in coordination with other competent authorities, must pay the utmost heed to.

BEREC received five contributions in response to the consultation on the draft Guidelines.

In general, stakeholders welcomed the opportunity to comment on the draft BEREC Guidelines detailing Quality of Service Parameters.

After this public consultation, BEREC adopted the final Guidelines.

Documents:

BoR (24) 41: BEREC Report on the outcome of the public consultation on the draft BEREC Guidelines detailing Quality of Service Parameters

BoR (24) 42: BEREC Guidelines detailing Quality of Service Parameters

2.3.3. BEREC Report on empowering end-users through environmental transparency on digital products and services (carry-over)

BEREC considers end-users' awareness of environmental issues as critical to their empowerment and for ICT sustainability. Environmental information on digital products (including services) enlightens users about their digital consumption choices. This data-driven approach to end-user empowerment could create positive incentives for digital providers to support greener digital solutions and limit the risk of greenwashing.

In 2023, BEREC led a fact-finding mission to raise NRA awareness of existing work and analysis of environmental transparency around ICT sustainability products and end-user empowerment. This work took the form of a review of the literature and existing EU regulation, an internal questionnaire for member NRAs initiatives and other relevant stakeholder initiatives and a workshop on end-users' empowerment and ICT sustainability. It was attended by representatives of the Commission, consulting firms, BEUC and the European Environmental Bureau (EEB). The workshop recording was published on the BEREC YouTube channel in April 2024.

The BEREC Report on ICT sustainability for end users: Empowering end users through environmental transparency on digital products, was adopted by the BoR in December 2023 and published in June 2024.

The public consultation on the report ran from 14 December 2023 to 12 February 2024. The five contributions submitted were summarised and assessed in the BEREC Report on the outcome of the public consultation on the draft BEREC Report on ICT sustainability for end-users.

This work stream also featured a communication campaign on the environmental impact of end-user digital devices, prepared in collaboration with BEREC ENG Communications.

Document:

BoR (24) 82: BEREC Report on ICT sustainability for end-users: Empowering end users through environmental transparency on digital products

BoR (24) 81: BEREC Report on the outcome of the public consultation on the draft BEREC Report on ICT sustainability for end-users

2.3.4. BEREC Opinion on Article 123 EECC

Article 123 of the EECC introduces a specific review procedure on end-user rights, where BEREC is tasked with delivering an Opinion on market and technological developments in terms of the different types of electronic communications services (ECS), assessing to what extent Title III of Part III meets the objectives set out in Article 3 of the EECC.

The EC, with the utmost consideration for the BEREC Opinion, is required to publish a Report on the application of Title III of Part III (on end-user rights) and submit a legislative proposal to amend that Title where it considers this to be necessary to ensure that the general objectives set out in Article 3 of the EECC continue to be met.

BEREC adopted its first Opinion in 2021, BoR (21) 177. The periodic review is being taken after 3 years in order to reassess, among other things, the trends and developments that have occurred since 2021, and which are having, or might have, an impact on end-user rights.

In preparing this Opinion, BEREC collected extensive evidence through information requests sent to NRAs, along with informal calls for input from interested stakeholders. It ran a workshop to facilitate discussions, offering a comprehensive perspective on the end-user rights landscape, particularly in relation to various stages of contracts and key issues in the electronic communications sector.

The hybrid workshop was held on 9 February 2024, with more than 230 participants in attendance. They discussed how market and technological developments were affecting the rights of end-users and their ability to make free and informed choices. They also discussed

other rights stemming from the EECC and whether any lack of these abilities had caused or were causing market distortions or end-user harm. The workshop consisted of presentations from BEREC, stakeholders and end-user associations, as well as the EC.

The discussions and topics were divided into six sessions, where the various interested parties gave their perspectives and views.

Discussions at the workshop collectively aimed to provide an overview of the end-user rights landscape, covering different phases of contracts and addressing key issues within the electronic communication services sector.

Additionally, BEREC considered other relevant sources to assess how end-user issues are addressed within the broader strategic priorities set by BEREC and the EC. This Opinion presents BEREC's key conclusions and highlights several critical issues particularly worthy of consideration.

BEREC assessed the recent trends and developments by dividing them into three distinct categories (lists): market developments, technological trends and legislative changes, which resulted in a comprehensive and structured analysis of the electronic communications sector. This approach ensured a clear and focused examination of each aspect, enabling a better understanding of how different factors interact and contrasting the information with stakeholders' views.

Generally, BEREC considers that Title III of Part III of the EECC is future-proofed, ensuring that end-user rights are upheld despite ongoing developments in the electronic communications sector. In most cases, the framework's robust structure allows it to adapt to new challenges and technological changes. However, there are some areas where improvements could be made to enhance its efficiency and end-user experience.

Since the results of NRA and informal stakeholder surveys do not evidence any significant market distortion or harm to end-users from recent trends and developments, BEREC has not estimated the potential costs of adjustments. BEREC does not intend to propose new wording for legislative initiatives. On the other hand, BEREC anticipates some advancements, which might have a positive impact on end-users, hence some areas are emphasised in BEREC's assessment and should be taken into consideration when making future changes in the regulatory framework. In some instances, BEREC's view is that it is sufficient for NRAs to cooperate closely to ensure proper end-user protection. In other cases, BEREC highlights some areas where there is a risk that the objectives of Article 3 of the EECC are not met if considered when changing the legislation. Also in some cases there were considerations on the need for clarification or preventing disparities. Moreover, BEREC proposed that some aspects might be considered to advance end-user protection.

Documents:

BoR (24) 140: Summary Report on the BEREC Workshop on end-user rights, 9 April 2024

BoR (24) 180: BEREC Opinion on the market and technological developments and on their impact on the application of rights of end-users in the EECC (Article 123)

2.4. Cooperation with EU institutions and institutional groups

2.4.1. Implementation of BEREC's Medium-Term Strategy for relations with other institutions and international cooperation

The BEREC strategy 2021-2025 recognises the growing convergence of issues in the field of electronic communications worldwide and the increasingly global nature of electronic communication networks and electronic communications services. These trends mean that policies, legislation and regulation must be seen from a more global perspective. As stated in this strategy, BEREC has benefited since its foundation from the cooperation of NRAs and other international regulatory networks, policymakers and institutions involved in communications, including outside the EU. This cooperation has been formalised and strengthened since 2021 by BEREC's Medium-Term Strategy for international cooperation[45] ('IC MTS').

The IC MTS addresses the need for BEREC to establish and maintain relationships with external parties for the execution of BEREC's tasks. In evaluating BEREC's international commitments it explains in a detailed and transparent manner what type of cooperation and engagement could be envisaged with each of its international partners. In line with Article 35 of Regulation (EU) 2018/1971, the IC MTS is to be factored in when drafting BEREC international activities in its multi-annual work programmes.

BEREC organised a study trip to Brazil this year to discuss connectivity, technological developments, projects such as Sustainable Integrated Amazon Project (PAIS), regulatory aspects and best practices in policy and regulatory activity with its Brazilian counterparts and leading industry players[46]. Apart from the study trip, BEREC was in regular contact in 2024 with its international partners by participating in their meetings (e.g. Regulatel, EaPeReg, EMERG meetings) or in the context of bilateral meetings.

[45] BoR (21) 135, BEREC's Medium-Term Strategy for international cooperation for the period 2022-2025, 30.09.2021, see: https://berec.europa.eu/en/document-categories/berec/berec-strategies-and-work-programmes/berecs-medium-term-strategy-for-international-cooperation-for-the-period-2022-2025

[46] BEREC Report on the Study Visit to Brazil 2024, see: https://www.berec.europa.eu/en/document-categories/berec/reports/berec-report-on-the-study-visit-to-brazil-2024

Document:

BoR (24) 53: BEREC calendar of international activities and events in 2024

2.4.2. BEREC cooperation with EC regarding Guidance on the application of Art. 3 of the GIA – Access to existing physical infrastructure

After reaching political agreement in February of 2024, the new Gigabit Infrastructure Act (GIA) entered into force on 11 May 2024[47]. The GIA aims to ease the roll-out of very high capacity networks (VHCNs) so that such networks can be rolled out faster and at a lower cost. It replaces the Broadband Cost Reduction Directive (BCRD)[48]. Article 3(13) of the GIA empowers the Commission to issue Guidance on the application of the rules on Access to existing physical infrastructure, as set out in Article 3 GIA.

During the third Contact Network's and Plenary's meetings, the EC informed BEREC of its intention to issue guidance on access to the existing physical infrastructure under Article 3(13) GIA. The GIA tasks BEREC with work on key articles of the new Regulation, including supporting the EC in close cooperation on its work to provide guidance on Article 3.

In mid-October 2024, the Commission initiated its work on those guidelines in close cooperation with BEREC. During October and November 2024, the Commission asked BEREC to contribute to the early stages of the draft structure of the questionnaire. BEREC submitted feedback on the proposed draft structure at the end of November and offered further cooperation in the future. The Commission intends to conduct a targeted consultation of stakeholders in Q1 2025. The adoption of these guidelines is tentatively envisaged by the end of 2025.

[47] Regulation (EU) 2024/1309 of the European Parliament and of the Council of 29 April 2024 on measures to reduce the cost of deploying gigabit electronic communications networks, amending Regulation (EU) 2015/2120 and repealing Directive 2014/61/EU (Gigabit Infrastructure Act), 08.05.2024, see: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202401309

[48] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks Text with EEA relevance, see: https://eur-lex.europa.eu/eli/dir/2014/61/oj/eng

2.5. BEREC's other tasks

BEREC ad hoc work

2.5.1. Ad hoc input to the EU Institutions/NRAs

The EC published the White Paper – How to master Europe's digital infrastructure needs? on 21 February 2024. As already referenced under section A, the document elaborates on the trends and challenges in the digital infrastructure sector and, having identified the issues, puts forward possible scenarios to master the transition to the digital networks of the future. In all, the White Paper sets out 12 scenarios as policy options for the future, articulated around three pillars.

The EC launched a public consultation on the proposed scenarios that closed on 30 June 2024. On 28 June 2024, the BEREC approved what would be its input to the EC's public consultation.

Welcoming the opportunity to contribute to this debate, BEREC provided its views on the technological trends and market developments outlined in the document, emphasising that competition remains the most powerful tool to ensure that operators have incentives to invest and innovate. BEREC's analysis focused on the framework's scope and objectives, general authorisation regime, radio spectrum, copper switch-off, access regulation and remedies. BEREC also looked into universal services, affordability, sustainability, security and resilience. The submission also pointed out that the ideas outlined in the White Paper need to be framed within the full context of the electronic communications' legislative framework, including Open Internet and end-user protection rules, which are essential to uphold.

BEREC further expressed its willingness to continue the dialogue with the EC and contribute to future Commission's initiatives falling within its remit, including those related to the governance of the digital sector.

Documents:

BoR (24) 100_1: BEREC's input to the EC public consultation on the White Paper How to master Europe's digital infrastructure needs?

BoR (24) 100_2: BEREC High-Level input on the Commission's White Paper on How to master Europe's digital infrastructure needs?

2.5.2. Ad hoc work on ICT sustainability in the frame of the European Green Deal implementation

BEREC carried out ad hoc work on environment-related issues for the EC's White Paper and its call for contributions on competition in generative AI and virtual worlds, factoring in the objectives of the European Green Deal.

BEREC's high level position on artificial intelligence and virtual worlds included an assessment of the environmental impact of AI and virtual technologies. It emphasised the importance of collecting robust, high-quality data to effectively evaluate this impact and highlighted the need to consider all stages of the generative AI system lifecycle. Additionally, it stressed that AI's potential contribution to the green transition of industrial sectors can only be effective if AI systems themselves are sustainable.

In its contribution to the EC public consultation on the White Paper, BEREC advocated for a holistic approach to considering all relevant environmental impacts of digital technologies. BEREC highlighted key steps to promoting greener technologies. These include improving the measurement of digital technologies' environmental footprint, enhancing transparency among stakeholders, and developing greener infrastructures through relevant regulatory initiatives. BEREC also emphasised the importance of supporting sustainable practices to promote environmental accountability in the digital ecosystem and empowering users to make informed choices about environmentally friendly digital products and services.

2.5.3. Ad hoc work on cybersecurity-related matters

BEREC continued its collaborative work of implementing the recommendations of the 'Nevers Call' together with the NIS Cooperation Group consisting of the representatives from the Member States, ENISA and the European Commission. It had been invited to formulate recommendations based on a risk assessment so as to reinforce communications networks and infrastructure resiliency within the European Union.

In this role, BEREC provided feedback on several ENISA draft reports covering topics ranging from mitigating smishing (SMS phishing) attacks to cybersecurity aspects of CPE (customer premises equipment).

CPEs play an essential role in providing internet connectivity, telephony, and television services to end users, and they are very vulnerable to cybersecurity threats. Any incident compromising the security of CPEs, not only jeopardises the privacy and data security of individual customers, it could potentially, as an entry point to an operator's network, disrupt critical infrastructure and services.

BEREC coordinated more implementation tasks of the 'Nevers Call' recommendations with ENISA as well as the ECASEC expert group and provided further input to on-going and future joint activities which will carry over to the 2025 work programme.

2.5.4. Peer review process and engaging with the RSPG

BEREC and the Radio Spectrum Policy Group (RSPG) agreed on working arrangements on 13 June 2019 (see also BoR (19) 100). These arrangements set out the way the two bodies can cooperate as BEREC participates in the Peer Review Forum. This was done with regard to the requirements of Article 35 of the EECC. The cooperation arrangement is as follows:

- to use the Peer Review Forum as an instrument of peer learning; to promote the view that the Peer Review Forum is the best way forward as it convenes national NRAs and other competent authorities with expertise on comparative or competitive selection procedures pursuant to the electronic communications' regulatory framework;
- to cooperate in the implementation of the Peer Review Forum;
- to appoint liaison officers in both BEREC and the RSPG to strengthen the relationship between the two bodies and to facilitate the implementation of this arrangement. The Wireless Network Evolution co-chairs are BEREC's liaison officers.

The Peer Review Forum is convened by the RSPG only when required. The responsibilities for adopting and publishing reports on Peer Review are set out in Article 35(7) and (9) of the EECC, and these fall to RSPG to deliver also having regard to the RSPG Rules of Procedure. In 2024, there were no Peer Review Forums.

2.5.5. Ad hoc work on artificial intelligence and virtual worlds

In March 2024, BEREC replied to the EC's calls for contributions on competition in generative artificial intelligence (AI) and virtual worlds (VW) and published a high-level position on the topic.

BEREC's opinion builds on previous analyses, such as BEREC reports on using AI to provide ECN/ECS, on the internet ecosystem and on the ex-ante regulation of digital gatekeepers. BEREC provided a holistic perspective on AI and VW as it believes that in order to unleash the potential of AI and VW, and to make sure that these technologies develop for the benefit of European citizens, many different aspects such as competition dynamics, internet openness, the environmental footprint of this technology and cybersecurity should be taken into account.

Document:
BoR (24) 68: BEREC high-level position on artificial intelligence and virtual worlds

2.5.6. Ad hoc group work on the assessment of third countries applications to participate in the work of BEREC and BEREC Office

Following the Decision No BoR/2024/01 of the Board of Regulators to establish a Procedure to address requests of NRAs of third countries to participate in the work of the Body of European Regulators for Electronic Communications (BEREC) and the Decision

No MB/2024/03 of the Management Board of the Agency for Support for BEREC (BEREC Office) to establish a Procedure to address requests from NRAs of third countries to participate in the work of the Body of European Regulators for Electronic Communications (BEREC) BEREC set up an ad hoc group to assess the applications of third countries to participate in the work of BEREC and BEREC Office.

The first application to be assessed was the application from ANRCETI, the regulatory authority of Moldova. To be eligible to participate in the work of BEREC and BEREC Office the criteria acc. to Article 35 of the BEREC Regulation have to be met, i.e. the applicant has to be the regulatory authority with primary responsibility in the field of electronic communications and the agreement in place between the Union and the relevant third country covers cooperation on the EU electronic communications framework. The assessment recommended the acceptance of ANRCETI's application to become a member without voting rights and to enter into negotiations on draft working arrangements. The BoR and the MB adopted the Decision No BoR/2024/04 on 6 June and Decision No MB/2024/11 on 7 June 2024. They entered into force immediately. The applicant and the EC were informed on the positive outcome of the assessment. Negotiations on the draft working arrangements were initiated and upon conclusion submitted to the EC for approval under Article 35(1) and recital 20 of the BEREC Regulation. Once the EC has approved the draft working arrangements they will be authorized by the BoR and the MB and signed by the BEREC Chair and a representative of ANRCETI.

The ad hoc group also assessed the application from PSRC, the regulatory authority of Armenia. In this case the ad hoc group concluded that PSRC does not meet the eligibility criteria and recommended to reject the application to become a member without voting rights. The BoR and the MB adopted the Decision No BoR/2024/06 on 3 October and Decision No MB/2024/13 on 4 October 2024.

Documents:

Decision No BoR/2024/04 (BoR (24) 106) of the Board of Regulators accepting the application of National Regulatory Authority for Electronic Communications and Information Technology of the Republic of Moldova (ANRCETI) to become Participant without voting rights

BoR (24) 105: Recommendations ANRCETI

Decision No MB/2024/11 (MB (24) 63) of the Management Boards of the Agency for Support for BEREC (BEREC Office) accepting the application of National Regulatory Authority for Electronic Communications and Information Technology of the Republic of Moldova (ANRCETI) to become Participant without voting rights

MB (24) 62: Recommendations ANRCETI

Decision No BoR/2024/06 (BoR (24) 153) of the Board of Regulators on the application of Public Services Regulatory Commission of the Republic of Armenia (PSRC) to become Participant without voting rights

BoR (24) 152: Recommendations PSRC

Decision No MB/2024/13 (MB (24) 84) of the Management Boards of the Agency for Support for BEREC (BEREC Office) on the application of Public Services Regulatory Commission of the Republic of Armenia (PSRC) to become Participant without voting rights

MB (24) 83: Recommendations PSRC

BEREC's other tasks under EU legislation

2.5.7. BEREC's contribution to the implementation of the Digital Markets Act

In Article 7, the Digital Markets Act (DMA) introduces an obligation for designated gatekeepers to "make the basic functionalities of its number-independent interpersonal communications services interoperable with the number-independent interpersonal communications services of another provider offering or intending to offer such services in the Union, by providing the necessary technical interfaces or similar solutions that facilitate interoperability, upon request, and free of charge" (Article 7(1) DMA).

According to Recital 64 of the DMA, the designated gatekeeper should publish "a reference offer laying down the technical details and general terms and conditions of interoperability" with its NI-ICS, and the EC can consult BEREC "in order to determine whether the technical details and the general terms and conditions published in the reference offer that the gatekeeper intends to implement or has implemented ensures compliance with this obligation".

On 29 January 2024 the Commission formally requested that BEREC deliver an Opinion on Meta's *draft* reference offer for WhatsApp interoperability under Article 7 DMA. This Opinion was provided to the Commission on 15 February 2024.

Gatekeepers were required to comply with the DMA obligations by 7 March 2024. On that date, Meta published the reference offer to allow for WhatsApp interoperability. On 4 June 2024, BEREC issued its Opinion on Meta's *final* reference offer, published in March 2024.

BEREC is also a member of the DMA High-Level Group (HLG). The role of the HLG is to provide the EC with advice and expertise relevant for any general matter of implementation or enforcement of the DMA and fostering a consistent regulatory approach across different regulatory instruments, as well as to provide expertise to the EC on the need to amend, add or remove the DMA rules to ensure that digital markets across the European Union are contestable and fair.

BEREC also actively contributed to three DMA HLG subgroups on data-related obligations, interoperability and AI.

Documents:

BoR (24) 19: BEREC Opinion on Meta's draft reference offer to facilitate WhatsApp interoperability under Article 7 of the Digital Markets Act

BoR (24) 78: BEREC Opinion on Meta's reference offer published in March 2024 to facilitate WhatsApp interoperability under Article 7 of the Digital Markets Act

2.5.8. BEREC Opinion on the national implementation and functioning of the general authorisation regime

Pursuant to Article 122, paragraph 3 of the EECC, BEREC is obliged, by 21 December 2021 and every three years thereafter, to publish an Opinion on the national implementation of the general authorisation and how it is functioning, and on the impact on internal market operations.

BEREC adopted its first Opinion in 2021, when Member States were still transposing the EECC.

In 2024, BEREC carried out another assessment, as requested by the EECC, with a view to providing an updated picture of the current state of play of the general authorisation across the EU.

The revised Opinion was adopted in December 2024, following a public consultation which ran from 12 June to 26 July 2024.

The Opinion took stock of the EU-wide transposition of the General Authorisation-related provisions and illustrates the level of alignment of national notification forms with the BEREC template. It also covers the General Authorisation Database, as well as an overall assessment of the regime, giving an analysis of the overall requirements that can legitimately be imposed on ECN providers incorporated outside a given Member State. Consideration as to the suitability of adjusting the scope of the regime and the risks linked to the potential introduction of a Country-of-Origin approach were discussed, which is outlined in the Commission's White Paper.

Documents:

BoR (24) 189: BEREC Report on the outcome of the public consultation on the draft BEREC Opinion on the national implementation and functioning of the general authorisation, and on their impact on the functioning of the internal market, pursuant to Article 122, paragraph 3 EECC

BoR (24) 190: BEREC Opinion on the national implementation and functioning of the general authorisation, and on their impact on the functioning of the internal market, pursuant to Article 122, paragraph 3 EECC

2.5.9. BEREC Report on M2M and permanent roaming (carry-over)

Regulation (EU) 2022/612 (the 'Roaming Regulation') makes particular reference to M2M services (in recitals 14 and 21) and introduces new monitoring requirements.

For the report on this topic, BEREC analysed M2M services that enable roaming for 'periodic travelling' but also that rely on permanent roaming. BEREC investigated potential obstacles for operators to negotiate (permanent) roaming agreements, whether they enable permanent roaming in their network for the provision of such services, and what pricing schemes are applied.

A call for input ran from the end of 2023 until the beginning of 2024. The input received and information from the BEREC Roaming Data Report was used to carry out the analysis, which was ready for public consultation in June 2024.

The public consultation closed August 2024, and the Report of consultation as well as the final report were approved by the BoR in December 2024.

Document:

BoR (24) 165: BEREC Report on M2M and permanent roaming

BoR (24) 164: BEREC Report on the outcome of the Public Consultation about the Draft BEREC Report on M2M and permanent roaming

2.5.10. International roaming benchmark data and monitoring report

According to Article 21 of the Roaming Regulation, BEREC must regularly monitor the retail and wholesale roaming prices for voice, SMS and data services, and the volume and revenue generated by mobile operators across the Member States. Moreover, BEREC must report regularly on developments in pricing and consumption patterns in the Member States for both domestic and roaming services, and on actual wholesale roaming rates for unbalanced traffic between roaming providers.

These benchmark data reports are widely appreciated by the relevant stakeholders and are used by the Commission to review the effectiveness of the Roaming Regulation.

BEREC published its 30th Benchmark Report in March 2024. The report also includes an Annex about international roaming in the Western Balkans.

Document:

BoR (24) 38: 30th BEREC International Roaming Benchmark Data and Monitoring Report

2.5.11. BEREC Opinion about the functioning of the Roaming Regulation

The EC plans to publish a review of the Roaming Regulation in June 2025 after having consulted BEREC. BEREC is preparing its Opinion and is considering the data it collects annually from NRAs and operators (MNOs and MVNOs/resellers). In summer 2024, BEREC launched a call for input to collect additional feedback from relevant stakeholders about this review. BEREC's Opinion will be published by the end of March 2025.

Document:
BEREC Opinion to be adopted in 2025

2.5.12. Fourth Ukraine Roaming Monitoring Report

As a result of the ongoing war against Ukraine following Russia's invasion of Ukraine on 24 February 2022, BEREC has closely followed the telecommunications sector's response to the crisis and welcomed the measures that EU operators have voluntarily provided. The European Economic Area (EEA) and Ukrainian (UA) operators signed a Joint Statement introducing a stable framework to help people fleeing the war in Ukraine stay in touch with family and friends back home and maintain access to information. BEREC and the Ukrainian National Regulatory Authority, the NCEC, were tasked with monitoring the implementation of the agreed measures and, as such, they launched a fourth data collection round in 2024.

Altogether, seven UA operators and 22 EEA groups and operators signed the Joint Statement which is open to all operators willing to join. This report includes data from 53 mobile and 30 fixed operators' signatories representing 24 BEREC Member NRAs, while NCEC has received data from four mobile operators and two fixed operators. All the UA operators that provided data have signed the Joint Statement, hence there is no further differentiation between them.

Document:
BoR (24) 97: BEREC Analysis Monitoring of the Joint Statement agreed between Ukraine and EU Operators

2.5.13. Fifth Intra-EU communications Benchmark Report

Under Article 5(a)(6) of Regulation (EU) 2015/2120 of the European Parliament and of the Council of 25 November 2015, as amended by Regulation (EU) 2018/1971 of the European Parliament and of the Council of 11 December 2018, NRAs must monitor market and price developments for regulated intra-EU communications and report to the EC.

In October 2024, BEREC published its fourth intra-EU communications BEREC Benchmark Report, covering the period April 2023 to March 2024, which provides information on intra-EU communication services volumes, revenue and subscribers.

Document:

BoR (24) 137: Intra-EU communications BEREC Benchmark Report April 2023 – March 2024

2.5.14. BEREC Guidelines on the coordination of civil works according to Article 5(6) of the Gigabit Infrastructure Act and on access to in-building physical infrastructure according to Article 11(6) of the Gigabit Infrastructure Act

After reaching political agreement in February of 2024, the new Gigabit Infrastructure Act (GIA) entered into force on 11 May 2024[49]. The GIA aims to encourage the roll-out of very high capacity networks (VHCNs) so that such networks can be rolled out faster and at a lower cost. The GIA replaces the Broadband Cost Reduction Directive from 2014[50].

In early 2023, BEREC performed an in-depth analysis of the original Commission proposal on the GIA, which was published in February 2023. It then adopted its analysis of the GIA[51] on 16 May 2023. On this basis, BEREC engaged with the European Parliament, the Council and the Commission to present its analysis and to help to further improve the legislative proposal.

The GIA tasks BEREC, in close cooperation with the Commission, with providing guidelines on key articles in the new Regulation, namely Article 5, which concerns the coordination of civil works, and Article 11 on access to in-building physical infrastructure.

These Guidelines shall be provided by 12 November 2025, following close cooperation with the Commission.

Comprehensive questionnaires were distributed to the NRAs/DSBs, and a Call for initial stakeholder input was published on the BEREC webpage as part of the data gathering process

[49] Regulation (EU) 2024/1309 of the European Parliament and of the Council of 29 April 2024 on measures to reduce the cost of deploying gigabit electronic communications networks, amending Regulation (EU) 2015/2120 and repealing Directive 2014/61/EU (Gigabit Infrastructure Act), 08.05.2024, see: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202401309

[50] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014.

[51] BoR (23) 120, BEREC Analysis of the European Commission legislative proposal for a Gigabit Infrastructure Act, 16.05.2023, see: https://www.berec.europa.eu/en/document-categories/berec/others/berec-analysis-of-the-european-commission-legislative-proposal-for-a-gigabit-infrastructure-act

that began in July 2024. Over a period of eight weeks, we received responses from more than 50 stakeholders and 30 NRAs.

In 2025, BEREC aims to publish Guidelines under Articles 5(6) on the coordination of civil works and 11(6) on access to in-building physical infrastructure for public consultation, following adoption of the draft guidelines expected at Plenary 2 in June 2025.

BEREC envisages publishing Guidelines in time for when the GIA articles take full legal effect on 12 November 2025.

Document:
BEREC Guidelines to be published in 2025

2.5.15. BEREC Opinion on the methodology for the mapping of QoS coverage on Connectivity Indicators for the DDPP

Decision (EU) 2022/2481 of the European Parliament and of the Council (Decision) establishes the Digital Decade Policy Programme 2030 (DDPP) that it intended to guide Europe's digital transformation. It establishes digital targets and objectives in the realms of digital skills, digital infrastructure, digitalisation of business and of public services. Article 5(1) of the DDPP requires the EC to monitor Member States' progress towards the general objectives and the digital targets set out in the DDPP and, to that end, the EC is required to set out, by means of an implementing act, the KPIs for each digital target. On 30 June 2023 the Commission published the Implementing Decision setting out key performance indicators (among which the ones related to connectivity) to measure the progress towards the digital targets established by Article 4(1) of Decision (EU) 2022/2481 of the EC and of the Council, C(2023)4288_final of 30 June 2023.[52]

As part of the expected update of the Digital Decade KPIs, the EC intends to develop a "Methodology on 5G Mobile and Fixed QoS Coverage Mapping" enabling the mapping of QoS coverage for mobile broadband (in particular 5G). The methodology, which includes definitions, data gathering and modelling for having indicators, will be implemented through a new KPI; once the methodology and the modelling have been set, the indicators will be used for mapping.

BEREC was asked in early 2024 by the EC for an opinion on the first draft of a methodology for geographical mapping of 5G mobile connectivity and fixed wireless access (FWA) with

[52] EC Implementing Decision (EU) 2023/1353 of 30 June 2023, see: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=pi_com:C(2023)4288

quality of service (QoS) parameters.[53] The proposal of the methodology is from the University of Aachen contracted by the EC and aims at developing further the current KPI (in particular on 5G).[54] It will consider the BEREC Guidelines on Geographical Surveys of network deployments in accordance with Art. 22 of the EECC and the mapping Annex (Annex I) of the EU Guidelines on State Aid for Broadband.

The first draft of the methodology has been shared with BEREC on the 15th of July 2024.

While preparing this opinion, the contractor and the EC replied to a series of questions asked by BEREC experts to allow for a better understanding of the chosen concept and all the elements proposed.

This fruitful cooperation is a base for the BEREC present opinion and, according to the intended updated timeline by the EC, for the further work necessary on the methodology before it might be proposed for adoption.

The proposed methodology is part of an ambitious plan by the Commission which, through the proposed methodology, foresees the adoption of a new KPI within the Digital Decade Policy Programme (DDPP) to improve DDPP reporting and also for the purpose of State Aid assessment[55] ("multi-purpose approach").

At the time, BEREC prefers to focus its first opinion on the goal of the proposal and on the likely outcomes of its full application. Details on technical aspects will follow as long as the draft methodology will be commented by stakeholder and preliminarily tested.

In principle, BEREC welcomes the ultimate goal of the draft methodology which is to increase harmonisation in terms of evaluating and reporting 5G coverage – also in terms of network expected performance - throughout the EU and increase the comparability of the reported data.

It is also BEREC's view that adopting such a methodology for various purposes such as monitoring DDPP and State Aid raises critical challenges and could lead to the undermining of other regulatory processes and purposes due to contradictory information from other measurement methodologies. It is worthwhile for comparability purposes at European level, and BEREC will gladly provide its expertise, to carry out a robust model. However, it cannot be intended to supersede more precise information, such as detailed maps provided in some Member States at local level for the information of end users. This could lead to inefficiencies, hindering progress in delivering reliable information to the end-user. If monitoring 5G roll out at European level - to see if DDPP targets are met and to lead State Aid procedures - may

[53] First Draft of the „5G Mobile and Fixed QoS Coverage Mapping Methodology" presented by the EC/Consultant to BEREC on 16th July 2024

[54] EC Implementing Decision (EU) 2023/1353 of 30 June 2023, see: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=pi_com:C(2023)4288

[55] Guidelines on State Aid for Broadband networks, Annex I.

deserve more harmonisation through a European preferred methodology (like the one prepared by the EC), by approaching information given to end user and local authorities, it is recommended to take into account also the current practices to meet specific needs in different Member States and to benefit from best practices like BEREC's Art. 22 Broadband mapping Guidelines.

Generally, it is imperative to ensure that the tools and methodologies deployed for various objectives are tailored to their specific purposes. Some inherent trade-offs of the proposal, in terms of objectives, instruments, flexibility, costs and timing need in fact to be addressed carefully.

BEREC is also aware that the proposed methodology may require substantial investments by the operators and – most of all – NRAs/OCAs (in terms of costs for the simulator and mapping and resource training). Moreover, for this methodology it is necessary to have a full-scale 3D terrain model including 3D models of buildings and terrain for the entire area in question. Regular updates will also be necessary.

Therefore, BEREC expects that establishing such new model would be very costly. For this BEREC very much welcomes the planned detailed consultation with mobile operators to verify the assumption of the author that mobile network operators (MNOs) already have such models and widely use it for network planning. Such consultation should be initiated as soon as possible, and BEREC should be informed on the implementation and results of the exercise.

The consultation with MNOs and small scale testing which is planned for early 2025 will be of high importance for further steps. Therefore, BEREC is of the opinion that the consultation with MNOs should be initiated as soon as possible to verify fundamental assumptions of the project, i.e. that the required calculation models are already available and used by the industry. This is important to understand the implementation cost and to reply to BEREC´s serious concerns regarding the administrative burden for NRAs/OCAs and the cost-benefit ratio of implementation of the proposed methodology for all the stakeholders.

BEREC is also convinced that the small scale tests will bring very important practical findings which will lead to a better informed discussion on the methodology (that would be fully applied only in 2027). Through the test, intact, it will be possible to compare the results of the new methodology with other, existing systems, and possibly also with real measurements in the chosen locations.

BEREC therefore considers that the currently proposed draft methodology should not be adopted without small scale testing because the cost and administrative burden of a full implementation (methodological and policy-wise, in terms of measured KPI) might outweigh any benefit reached in the form of unification of approaches. Furthermore, it risks contradicting results of existing tools.

Thus, the present Opinion is to be considered as a preliminary advice by BEREC on major topics of the proposal, in order to contribute in a constructive procedure for setting up such an important methodology. More accurate and specific comments will be shared after the results of the trial.

BEREC has also a number of very technical comments to certain elements proposed, but considers more productive to discuss them later after the first testing phase. At this stage, BEREC is inclined to support a simplified approach, using only easily available parameters such as lower resolution (grid raster as recommended in the BEREC Art. 22 GS GL) for the objective of comparison and monitoring at European level.

It must also be noted that national regulatory authorities (NRAs) currently apply different systems for 5G coverage mapping. Various calculation models are currently in use, whereas measurements are also widely applied for mapping and/or verification of the data.[56] In some countries, calculations are not done by operators, but are performed by NRAs who own (and paid for) the calculation models and are guaranteeing reliability of the data.

BEREC will start an update of its Guidelines on Article 22 broadband mapping in late 2025 which is also seen as an opportunity for further alignment of the NRA approaches thus increasing comparability, representing an opportunity to work in parallel with the Commission and explore synergies (see section 4).

Document:

BoR (24) 188: BEREC Opinion on the methodology for the mapping of QoS coverage of Connectivity Indicators for the DDPP

Monitoring quality, efficiency and sustainability

2.5.16. Inventory of the evolution of NRA competencies

In recent years, the EU has enacted legislation introducing forms of public intervention in the digital ecosystem, which is impacting the scope of some NRAs range of jurisdiction.

In line with Work Programme 2024, BEREC worked in-house on the scope of NRAs' institutional tasks, trying to track the latest developments in terms of NRAs' responsibilities, including the digital ecosystem.

Document:

BoR (24) 86: Inventory on NRAs' competencies (for internal use)

[56] Cf. also BEREC Implementation Report on Connectivity Indicators for the DDPP (BoR (24) 187).

2.5.17. Report on Regulatory Accounting in practice

The 2024 Regulatory Accounting in Practice (RAP) Report gives an overview of the main remedies imposed on significant market power (SMP) operators in relevant markets subject 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.

This is the 20th 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 NRAs and covers the implementation of regulatory cost accounting methodologies in the national market situations. As 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 EC 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 previous 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 (section 3.5). In this context some new elements about BU models are reported. The 2013 NDCM Recommendation has been updated and substituted in February 2024 by the new Gigabit

Recommendation[57], but as the cut-off date for this report was 1st April 2024, the majority of regulatory decisions were still referring to the NDCM Recommendation. 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 previous reports, 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 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 of this year's report is related to the adoption of the EC Notice on WACC.

Key findings

The RAP 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 RAP 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 of the report, 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

[57] 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.

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 concentrated. 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 17-19 of the report).

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 EECC.

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 EECC, 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 depth analysis on the application of the regulatory framework of the 2013 NDCM Recommendation, also in light of the new Gigabit Recommendation, has 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 (24) 102), the 2024 BEREC RAP 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)[58] 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 for a long time prior to the EC 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 EC WACC 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 EC WACC Notice continues to have a material convergent effect.

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.

[58] Cf. BoR (13) 110.

Future Developments

As can be seen from the results above the RAP 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 NDCM Recommendation on consistent non-discrimination obligations and costing methodologies. In 2025 the RAP 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 as well as the 2024 Gigabit Recommendation. 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 EC WACC Notice will be followed on.

Document:
BoR (24) 166: BEREC Report Regulatory Accounting in Practice 2024

2.5.18. BEREC Report on WACC parameter calculations according to the European Commission's WACC Notice of 6th November 2019 (WACC parameters Report 2024)

This is the fifth[59] BEREC Weighted Average Cost of Capital (WACC) parameters Report BEREC calculates the WACC parameters following the non-binding Commission's WACC Notice on the calculation of the cost of capital for legacy infrastructure in the context of the Commission's review of national notifications in the EU electronic communications sector of 6th Nov. 2019[60]. The cost of capital is the core element of any regulatory pricing decision NRAs take. The Notice aims to ensure a consistent calculation of the WACC by national regulatory

[59] The four previous BEREC WACC parameters Reports are available on the BEREC website, www.berec.europa.eu, BEREC WACC parameters Report 2020 (BoR (20) 116); BEREC WACC parameters Report 2021 (BoR (21) 86); BEREC WACC parameters Report 2022 (BoR (22) 70), BEREC WACC parameters Report 2023 (BoR (23) 90).

[60] See: https://digital-strategy.ec.europa.eu/en/library/commission-publishes-notice-calculation-cost-capital-legacy-infrastructure

authorities (NRAs) thereby contributing to the development of the internal electronic communications market.

As the Commission's Notice has not changed, BEREC is following the same methodology (incl. 'technical choices') as in last year's Report providing utmost continuity.

BEREC calculates each of the parameters of the WACC formula (using the CAPM approach) following the Notice. The cost of capital is the core element of any regulatory pricing decisions NRAs take.

By explaining precisely and transparently how the results were, derived NRAs will be able to follow the BEREC calculation steps from start to end and to fully understand the logic of the calculation process so that they can replicate the results shown in the WACC parameters Report. This ensures that NRAs are confident that the results are robust and were derived using state of the art professional standards as well as following the Notice as closely as possible taking into account also best regulatory practices where the Notice provides for NRAs' flexibility.

A complexity of the Notice and the WACC parameters Report is the calculation of an EU-wide ERP (equity risk premium). Based on the calculations described in Chapter 6 BEREC considers that the appropriate value of the single EU-wide ERP is **5.95 % (AM).** As the same methodology as last year was used, the minor increase from 5.92 % in 2023 to **5.95%** in 2024 is attributable to factual developments. This is in line with the stabilization of the economic conditions in comparison to previous years and returning to a "normal" situation with an equity market that is outperforming the corresponding bond market.[61]

Since 2021, BEREC estimates additionally a separate EU/EEA-ERP for exclusive use by Nkom (Norway), ECOI (Iceland) and AK (Liechtenstein)[62].

The BEREC peer group comprises 14 companies this year as Telenet was delisted after having been acquired by Global Liberty and no new peer fulfilled the requirements.

In section 7.2 (Taxes and inflation) BEREC has expanded on the temporarily increased inflation rate and how to deal with it within the framework of the Notice. BEREC refers to its statements in the BEREC Opinion on the Draft Gigabit Recommendation (BoR (23) 83) as well as to the new Gigabit Connectivity Recommendation (EU) 2024/539 of 6th February 2024.

BEREC publishes the estimated WACC parameter values and NRAs are assumed to take into account those parameter values when carrying out their own calculations for their national regulatory decisions, but they do have some flexibility within this framework to take account of

[61] Cf. for a more detailed analysis Ch. 6.5 below and the UBS Global Investment Returns Yearbook 2024 Summary Edition, published at Global Investment Research & Insights | UBS Global, available here: Global Investment Returns Yearbook 2024 | UBS Global.

[62] As no data is available for Liechtenstein, the separately estimated EU/EEA-ERP includes only data for Norway and Iceland.

national specificities. BEREC observes that over time most NRAs follow the Notice and use the BEREC parameter values in their national decisions.

The 2024 WACC parameters Report contains an additional Annex “EC comments on WACC notifications of NRAs”.

For reference by NRAs, the Report is to be published before 1st July 2024 when the Commission applies it according to the Notice when reviewing NRA’s notifications in the EU electronic communications sector.

Document:
BoR (24) 102: BEREC Report on WACC parameter calculations according to the European Commission’s WACC Notice of 6th November 2019

2.6. Stakeholder engagement

2.6.1. Stakeholder Forum

On 26 March 2024, BEREC held its annual Stakeholder Forum, which was again an excellent opportunity for stakeholders from the telecommunications industry, policymakers and other interested parties to discuss the latest telecom developments and share ideas. The BEREC Stakeholder Forum followed its traditional format, which included a Meet & Greet session (30-minute informal meetings that allow stakeholders to interact with the BEREC Working Group co-chairs) in the morning and a Conference in the afternoon.

The 2024 event gathered 298 in-person participants and almost 1000 online viewers from over 200 organisations and 27 NRAs. Audiences could access a livestream, not only via the BEREC website but also through its official social media platforms. Event-related feedback (from multiple sources, including a survey) indicates that participants were happy with the content and logistics. The event was promoted through a dedicated website and on BEREC's website, a social media campaign, and newsletters to stakeholders and media. As part of the promotional efforts for the Stakeholder Forum, the BEREC Office developed engaging social media video reels aimed at capturing stakeholders’ attention and prompting them to be actively involved in the event. These video reels enriched the overall campaign content and amplified its impact, leading to heightened awareness and interest in the matters that BEREC works on. Pursuing our continued efforts to strengthen our digital presence and increase transparency, for the first time we dedicated resources to a post-event campaign. We focused primarily on content for YouTube shorts to increase visibility of BEREC’s role and expertise. We developed a specific campaign, capturing key messages from the event in video format. This was backed up by additional related information that encouraged people to subscribe to our content.

2.6.2. BEREC Annual Report

The Annual Report of 2023 begins with a foreword by Prof. Konstantinos Masselos (EETT, Greece), BEREC Chair 2023, who focused on the comprehensive range of actions and initiatives that BEREC undertook while remaining steadfast to contributing to meaningful connectivity, addressing societal needs and adapting to the ever-evolving digital landscape.

The 2023 work programme centred on three strategic goals: promoting full connectivity, sustainable open digital markets and empowering end-users.

The annual report summarises BEREC's work over 2023, which covered a wide range of areas such as regulatory updates, investment implications and ensuring competition in the evolving telecom sector. In response to the changing dynamics in intra-EU communications, BEREC carried out a thorough review, which provides valuable insights into the effects of the existing measures on regulated services. Additional work addressing market challenges, such as the phasing out of 2G and 3G networks, exploring the role of artificial intelligence in the telecom sector, and evaluating the security of 5G networks, demonstrate BEREC's commitment to staying ahead of technological advances and potential regulatory impacts. BEREC also explored areas such as cloudification, virtualisation, and softwarisation over the course of the year. It studied the competitive dynamics of tower and access infrastructure companies not directly providing retail services. It updated the Very High Capacity Networks Guidelines. It analysed the indicators for measuring the environmental impact of electronic communication networks and services. It issued a draft report on the General Authorisation of submarine connectivity, with a suggestion to adapt a comprehensive European policy to make it easier to deploy submarine cable systems in multiple European countries.

This annual report describes BEREC's consumer-focused work, including its evaluation of the definitions of adequate broadband internet access service, a report on comparison tools and accreditation and reviewing the Guidelines for Quality of Service (QoS) parameters set out in the 2020, thus reinforcing BEREC's commitment to ensuring that electronic communications services meet consumer needs.

The report also lays out BEREC's international and institutional work – playing an important role in facilitating collaboration between the telecom industry and Ukraine, bringing about an agreement between operators on retail price caps to reduce roaming charges when traveling between the European Union and Moldova and strengthening its global presence by running the Four-lateral summit with EAPEREG-EMERG-REGULATEL, at which all four organisations committed to creating a sustainable and inclusive digital future and to improving international connectivity.

Document:

BoR (24) 92: BEREC Annual Report for 2023

2.6.3. BEREC Communications Plan 2024

The BEREC Communications Plan 2024 covered the communications work and projects in the diary for the year. The objective was to strengthen the perception of BEREC as an independent, European, forward-looking expert body, and support the overall strategic objectives of BEREC. These included promoting full connectivity, supporting sustainable and open digital markets, and empowering end-users. The Plan runs alongside the BEREC External Communications Strategy, which sets out BEREC's overall approach to communications.

The main project of the year was completing the new BEREC website design and content, with it being launched in mid-July 2024. We then created and launched an educational social media campaign in the autumn to promote it.

Another project was to plan and execute a comprehensive social media campaign on the BEREC Report on ICT sustainability for end-users: Empowering end-users through environmental transparency on digital products. The campaign aimed to raise awareness among end-users on the importance of adopting more sustainable and eco-friendly practices when using their digital devices. This entailed distributing educational information on users' environmental rights, such as the right to repair, legal guarantees and energy labelling, while also advocating for behavioural changes such as prolonging the lifespan of devices, repairing, recycling, and reusing, and advocating for the conscientious use of airplane mode or Wi-Fi whenever possible. Several BEREC member NRAs translated campaign materials to their national languages and shared the information and visuals on their own social media channels.

In its day-to-day communications activities, BEREC continued organising regular BEREC public events, such as public briefings and the Stakeholder Forum, regularly updated its main communications platform (the website), published news items and press releases on key achievements, produced audio-visual and digital content, ran other social media campaigns and kept up its relations with media outlets.

2.6.4. Developing the BEREC Work Programme 2025

The BEREC Work Programme for 2025 was adopted by the Board of Regulators at the plenary meeting in December 2024. It sets out the priorities that the Board of Regulators has identified for 2025, as well as projects on other emerging topics of interest. The objectives of this Work Programme are based on the BEREC Strategy 2021-2025[63], with a close focus on three priorities: promoting full connectivity, supporting sustainable and open digital markets, and

[63] BoR (20) 108, BEREC Strategy 2021 – 2025, 12.06.2020, see: https://www.berec.europa.eu/en/document-categories/berec/berec-strategies-and-work-programmes/berec-strategy-2021-2025

empowering end-users. This Work Programme also reflects BEREC's 'Medium Term Strategy for relations with other institutions'[64].

In 2025, BEREC will continue to support the implementation of the EECC at national levels and will oversee progress throughout the European Union. Promoting full connectivity for consumers and businesses remains a key priority for BEREC in 2025. In line with the EU's ambition to create a Europe that is fit for the digital age, BEREC will work to facilitate the roll-out of very high-capacity networks (VHCNs) to try to narrow the digital divide. Through its cooperation with other authorities and stakeholders, BEREC will also help to ensure that future network technologies meet their connectivity targets in line with European values and societal needs, such as (cyber)security, network resilience, safety, and environmental challenges.

Closing the digital divide entails more than just the roll-out of VHCNs. It also means providing end-users with a level of service that meets their needs. BEREC will empower end-users by exploring issues related to switching and ending contracts and plans to hold a joint workshop with the European consumer organisation, BEUC[65] on the topic of end-user's rights.

Open and sustainable European digital markets are the cornerstone of a Europe that is fit for the digital age. In line with both BEREC's strategic priority to support sustainable and open digital markets and BEREC's role in the European High-Level Group of Digital Regulators for the enforcement of the Digital Markets Act (DMA)[66], BEREC will continue to monitor and analyse developments in the digital markets and the impact of large online platforms. 2025 will see BEREC continue to monitor the implementation of recent legislation (the Data Act[67], the Digital Services Act (DSA)[68]) and Artificial Intelligence Act (AIA)[69] and how it impacts the electronic communications sector. In particular, with BEREC's involvement in the EC's Artificial Intelligence sub-group of the DMA High-Level Group, BEREC may explore how the integration of AI influences key aspects such as competition dynamics, internet openness, end-user experience, data protection, accessibility, security, and the digital divide.

BEREC will work intensively on several essential tasks that have been entrusted to it by the co-legislators to provide the best advice to the European Parliament, the Council, and the EC

[64] BoR (21) 137, BEREC's Medium Term Strategy for relations with other institutions 2022-2025, 30.09.2021, see: https://www.berec.europa.eu/en/document-categories/berec/berec-strategies-and-work-programmes/berecs-medium-term-strategy-for-relations-with-other-institutions-2022-2025

[65] BEUC | The European Consumer Organisation

[66] Regulation (EU) 2022/1925 of the European Parliament and of the Council of 14 September 2022 on contestable and fair markets in the digital sector and amending Directives (EU) 2019/1937 and (EU) 2020/1828 (Digital Markets Act)

[67] Regulation (EU) 2023/2854 of the European Parliament and of the Council of 13 December 2023 on harmonised rules on fair access to and use of data and amending Regulation (EU) 2017/2394 and Directive (EU) 2020/1828 (Data Act)

[68] Regulation (EU) 2022/2065 of the European Parliament and of the Council of 19 October 2022 on a Single Market for Digital Services and amending Directive 2000/31/EC (Digital Services Act)

[69] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence (AI Act)

on electronic communications. This will include an Opinion on the review of the Roaming Regulation and an Opinion on the review of the Universal Service.

BEREC will review three strategic documents to set out its objectives for the period 2026-2030, taking into account the latest and expected relevant market, technological and regulatory developments for the next five years.

Document:
BoR (24) 183: BEREC Work Programme 2025

Annex 1 – Meetings with the European institutions and other European Union bodies

- Meetings with the European Commission

Dates/place	Event
24 January, Brussels, Belgium	Meeting with DG CONNECT
2 February, Brussels, Belgium	Meeting of the High Level Group for the Digital Markets Act
9 February, Virtual meeting	Meeting with DG CONNECT regarding clarifications on EC Roadmap on a methodology for QoS mapping
26 March, Brussels, Belgium	Meeting with DG CONNECT
30 April, Brussels, Belgium	Meeting of the High Level Group for the Digital Markets Act
30 April, Belgium Brussels	Meeting of the Article 2 subgroup of the High Level Group for the Digital Markets Act
16 June, Virtual meeting	Presentation by DG CONNECT of the draft 5G-QoS Mapping Methodology
20 September, Belgium, Brussels	Meeting of the Article 2 subgroup of the High Level Group for the Digital Markets Act
20 September, Belgium, Brussels	Meeting of the High Level Group for the Digital Markets Act
27 September, Virtual meeting	Meeting with DG CONNECT – exchange of views on the White Paper “How to master Europe’s digital infrastructure needs?”
1 October, Virtual meeting	Meeting with DG CONNECT – exchange of views on the 5G-QoS Mapping Methodology
24 October, Virtual meeting	Meeting with DG CONNECT – exchange of views on the White Paper “How to master Europe’s digital infrastructure needs?”
19 November, Virtual meeting	Meeting with DG CONNECT – exchange of views on the 5G-QoS Mapping Methodology

- Meetings with the European Parliament/European Council

Dates/place	Event
23 January, Brussels, Belgium	ITRE hearing – BO Director
10 September, Brussels, Belgium	Council Working Party for the Telecommunications and Information Society (WP TELE) meeting presenting BEREC input to the EC public consultation on the White Paper “How to master Europe’s digital infrastructure needs?”

10 October, Budapest, Hungary	Conference Regulation Reloaded – Changing the Rulebook of Electronic Communications, organized by Hungarian Presidency of the Council of the EU 2024 and NMHH
2 December, Brussels, Belgium	ITRE-BEREC annual Exchange of Views in Committee meeting

- Meetings and workshops with other EU bodies

Dates/place	Event
9 October, Brussels, Belgium	NIS Cooperation Group meeting
5 November, Mainz, Germany	Joint ECASEC-ENISA-BEREC meeting

Annex 2 – Public debriefings and BEREC engagement with stakeholders

Dates/place	Event
13 March 2024, Virtual meeting	Public debriefing on the outcomes of the 58th BEREC ordinary meetings
14 March 2024, Virtual meeting	BEREC Workshop "Digital networks developments: players and strategies“
26 March 2024, Brussels, Belgium	12th BEREC Stakeholder Forum
09 April 2024, Hybrid (Brussels, Belgium and virtual)	BEREC Workshop on End-Users rights
11 April 2024, Hybrid (Brussels, Belgium and virtual)	BEREC Workshop on ex ante regulatory experience concerning commitments, wholesale-only undertakings and commercial agreements review
22 May 2024, Hybrid (Mainz, Germany and virtual)	BEREC external workshop about the usage of satellite technologies in mobile communications
12 June 2024, Virtual meeting	Public debriefing on the outcomes of the 59th BEREC ordinary meetings
09 October 2024, Brussels, Belgium	Public debriefing on the outcomes of the 60th BEREC ordinary meetings
19 November 2024, Virtual meeting	BEREC Stakeholder Workshop on Network Resilience
11 December 2024, Virtual meeting	Public debriefing on the outcomes of the 61st BEREC ordinary meetings

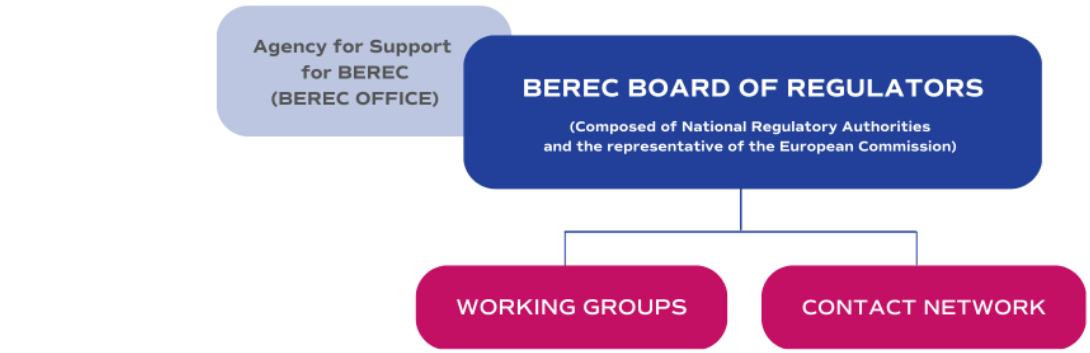
Annex 3 – International events[70]

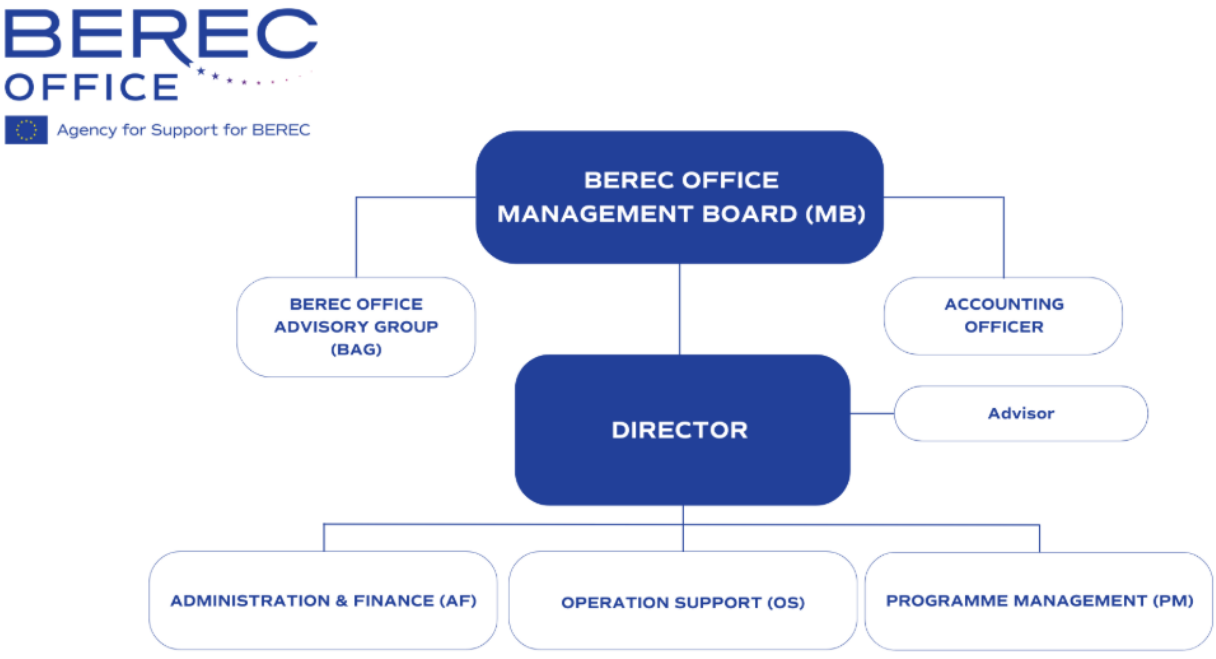
Dates/place	Event
24 January 2024, Brussels, Belgium	European Internet Forum: debate The future of the electronic communications sector & connectivity
29 January 2024, Brussels, Belgium	ETNO workshop
30 January 2024, Brussels, Belgium	The European 5G Conference: session “Delivering a blueprint towards a unified telecoms market in Europe”
05 February 2024, Brasilia, Sao Paulo and Campinas, Brazil	Study trip 2024 (5-9.02.2024)
12 February 2024, Virtual meeting	Digital Europe Infrastructure and services WG meeting
21 February 2024, Madrid, Spain	CERTAL Pre-Ministerial Summit. Connecting Communities: Perspectives and Challenges of Digitization (21-22.02.2024)
26 February 2024, Barcelona, Spain	Meeting with ANRCETI
26 February 2024, Barcelona, Spain	Meeting with Regulatel
26 February 2024, Barcelona, Spain	Meeting with FCC
26 February 2024, Barcelona, Spain	Meeting with Amazon Web Services
26 February 2024, Barcelona, Spain	Meeting with Microsoft
26 February 2024, Barcelona, Spain	GSMA-BEREC Roundtable
27 February 2024, Barcelona, Spain	Meeting with OFCOM
27 February 2024, Barcelona, Spain	Meeting with AT&T
27 February 2024, Barcelona, Spain	Meeting with ETNO
12 March 2024, Brussels, Belgium	IIC Telecommunications and Media Forum 2024 (12-13.03.2024)
19 March 2024, Berlin, Germany	FttH Conference 2024 (19-21.03.2024)
25 March 2024, Brussels, Belgium	Meeting with Netflix
04 April 2024, Virtual event	Meeting with SpaceX
11 April 2024, Virtual event	NCEC Annual Conference
16 April 2024, Virtual event	International Conference "5G&Co. 2024 -Everything is connected" (16-17.04.2024)
23 April 2024, London, United Kingdom	Tower Exchange Meetup Europe 2024 (23-24.04.2024)

[70] For more information see: https://berec.europa.eu/en/berec-chairmanship

14 May 2024, Ohrid, North Macedonia	International Regulatory Conference (14-15.05.2024)
22 May 2024, Bucharest, Romania	EaPeReg Plenary meeting
12 June 2024, Brussels, Belgium	17th Seminar for National Judges and NRAs (12-13.06.2024)
19 June 2024, Brussels, Belgium	European Spectrum Management Conference (19-20.06.2024)
20 June 2024, Santa Cruz, Bolivia	BEREC-REGULATEL Summit (20-21.06.2024)
26 June 2024, Brussels, Belgium	MVNO World congress
01 July 2024, Kampala, Uganda	ITU GSR (01-04.07.2024)
10 July 2024, Marseille, France	Subsea World conference (10-11.07.2024)
24 July 2024, Virtual participation	EMERG Plenary (24-25.07.2024)
18 August 2024, Aspen, USA	Technology Policy Institute Aspen Forum (18-20.08.2024)
20 August 2024, Salzburg, Austria	Telecom Forum
21 August 2024, Riga, Latvia	Meeting with Minister of Transport of Latvia
24 September 2024, Brussels, Belgium	WIK conference (24-25.09.2024)
26 September 2024, Brussels, Belgium	High-Level Roundtable "The Future of Europe’s Digital Infrastructure"
01 October 2024, Budapest, Hungary	Forum Europe event
23 October 2024, Virtual participation	AI Summit 2024 (23-25.09.2024)
29 October 2024, Dubrovnik, Croatia	FTTH Congress Balkans (29-30.10.2024)
04 November 2024, Bangkok, Thailand	IIC International Regulators Forum 2024 (04-05.11.2024)
16 November 2024, Baku, Azerbaijan	ITU COP29
27 November 2024, Chisinau, Moldova	EaPeReg Assembly (27-28.11)
02 December 2024, Brussels, Belgium	Meeting with ITRE
05 December 2024, Riga, Latvia	Baltic Cybersecurity Innovation Forum CyberBazaar 2024

Annex 4 – BEREC and the BEREC Office: organisational structure[71]





[71] For more information see: https://www.berec.europa.eu/en/berec/organisational-charts

Annex 5 – BEREC Members and observers of the Board of Regulators (end of 2024)

List of the members and observers of the Board of Regulators established pursuant to Article 7 and Article 35(2) of Regulation (EU) 2018/1971 of the European Parliament and of the Council of 11 December 2018 establishing the Body of European Regulators for Electronic Communications (BEREC) and the Agency for Support for BEREC (BEREC Office).[72]

No	Country	Title	Name(s)	Surname(s)	Name of organisation	Member or Observer
-	Albania	Mr	Tomi	**Frasheri**	Electronic and Postal Communications Authority of Albania, AKEP	Observer
-	Austria	Mr	Klaus	**Steinmaurer**	Austrian Regulatory Authority for Broadcasting and Telecommunications (RTR-GmbH)	Member
-	Belgium	Mr	Michel	**Van Bellinghen**	Institut Belge des Postes et Télécommunications (IBPT / BIPT)	Member
-	Bosnia and Herzegovina	Mr	Draško	**Milinović**	Communications Regulatory Agency of Bosnia and Herzegovina (RAK)	Observer
-	Bulgaria	Mr	Ivan	**Dimitrov**	Communications Regulation Commission (CRC)	Member

[72] Composition of the Board of Regulators pursuant to Article 7 and Article 35(2) of Regulation (EU) 2018/1971, see: https://www.berec.europa.eu/en/berec/composition-of-the-board-of-regulators-pursuant-to-article-7-and-352-of-regulation-eu-20181971-1

-	Croatia	Mr	Tonko	**Obuljen**	Croatian Regulatory Authority for Network Industries (HAKOM)	Member
-	Cyprus	Mr	George	**Michaelides**	Office of the Commissioner of Telecommunications and Postal Regulation (OCECPR)	Member
-	Czech Republic	Mr	Marek	**Ebert**	Czech Telecommunication Office (CTU)	Member
-	Denmark	Mrs	Katrine	**Winding**	Danish Business Authority (DBA)	Member
-	Estonia	Ms	Kristi	**Talving**	Consumer Protection and Technical Regulatory Authority (ECPTRA)	Member
-	Finland	Mr	Jarkko	**Saarimäki**	Finnish Communications Regulatory Authority (FICORA)	Member
-	France	Mrs	Laure	**de La Raudiere**	Autorité de régulation des communications électroniques, des postes et de la distribution de la presse (ARCEP)	Member
-	Germany	Ms	Daniela	**Brönstrup**	Federal Network Agency (BNetzA)	Member
-	Greece	Mr	Konstantinos	**Masselos**	Hellenic Telecommunications and Post Commission (EETT)	Member
-	Hungary	Mr	András	**Koltay**	National Media and Infocommunications Authority (NMHH)	Member
-	Iceland	Mr	Hrafnkell	**Gislason**	Electronic Communications Office of Iceland (ECOI)	Observer
-	Ireland	Mr	Robert	**Mourik**	Commission for Communications Regulation (COMREG)	Member
-	Italy	Mr	Giacomo	**Lasorella**	Autorità per le Garanzie nelle Comunicazioni (AGCOM)	Member

-	Kosovo[73]	Mr	Nazim	**Rahimi**	Regulatory Authority of Electronic and Postal Communications (ARKEP)	Observer
-	Latvia	Ms	Alda	**Ozola**	Public Utilities Commission (SPRK)	Member
-	Liechtenstein	Mr	Rainer	**Schnepfleitner**	Office for Communications / Amt für Kommunikation (AK)	Observer
-	Lithuania	Ms	Jūratė	**Šovienė**	Communications Regulatory Authority (RRT)	Member
-	Luxembourg	Mr	Luc	**Tapella**	Institut Luxembourgeois de Régulation (ILR)	Member
-	Malta	Mr	Jesmond	**Bugeja**	Malta Communications Authority (MCA)	Member
-	Montenegro	Mr	Darko	**Grgurovic**	Montenegro Agency for Electronic Communications and Postal Services (EKIP)	Observer
-	North Macedonia	Mr	Jeton	**Akiku**	Agency for Electronic Communications (AEC)	Observer
-	Norway	Mr	John-Eivind	**Velure**	Norwegian Communications Authority (NKOM)	Observer
-	Poland	Mr	Jacek	**Oko**	Office of Electronic Communications (UKE)	Member
-	Portugal	Mrs	Patrícia Silva	**Gonçalves**	Autoridade Nacional de Comunicações (ANACOM)	Member
-	Romania	Mr	Valeriu	**Zgonea**	National Authority for Management and Regulation in Communications (ANCOM)	Member
-	Serbia	Mr	Dragan	**Pejovic**	Regulatory Agency for Electronic Communications and Postal Services (RATEL)	Observer

[73] This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence.

-	Slovak Republic	Mr	Ivan	**Martak**	Regulatory Authority for Electronic Communications and Postal Services (RÚ)	Member
-	Slovenia	Mr	Marko	**Mišmaš**	Agency for Communication Networks and Services of the Republic of Slovenia (AKOS)	Member
-	Spain	Mrs	Alejandra	**de Iturriaga Gandini**	Comisión Nacional de los Mercados y la Competencia **(**CNMC)	Member
-	Sweden	Mr	Dan	**Sjöblom**	National Post and Telecommunications Agency (PTS)	Member
-	The Netherlands	Ms	Annemarie	**Sipkes**	Authority for Consumers and Markets (ACM)	Member
-	Ukraine	Ms	Liliia	**Malon**	National Commission for the State Regulation of Electronic Communications, Radio Frequency Spectrum and the Provision of Postal Services (NCEC)	Observer
-		Mr	Roberto	**Viola**	European Commission	Observer

Annex 6 – Plenary meetings of the Board of Regulators in 2024

Dates/place	Event	Agenda and Conclusions
07 March 2024, Virtual meeting	58th BEREC ordinary meetings	58th Plenary
06-07 June 2024, Jurmala, Latvia	59th BEREC ordinary meetings	59th Plenary
03-04 October 2024, Budapest, Hungary	60th BEREC ordinary meetings	60th Plenary
05-06 December 2024, Ljubljana, Slovenia	61st BEREC ordinary meetings	61st Plenary

Annex 7 – Meetings of the Contact Network established prior to the Board of Regulators

Dates/place	Event	Agenda and Conclusions
15-16 February 2024, Virtual meeting	1st BEREC Contact Network meeting	CN1
16-17 May 2024, Vienna, Austria	2nd BEREC Contact Network meeting	CN2
12-13 September 2024, Belgrade, Serbia	3rd BEREC Contact Network meeting	CN3
14-15 November 2024, Athens, Greece	4th BEREC Contact Network meeting	CN4

Annex 8 – Publicly available documents approved by the Board of Regulators in 2024

- BEREC Opinions

Document number	Description	Date
BoR (24) 19	BEREC Opinion on Meta's draft reference offer to facilitate WhatsApp interoperability under Article 7 of the Digital Markets Act	15 February 2024
BoR (24) 57	BEREC Opinion on Phase II investigation pursuant to Article 32 of Directive (EU) 2018/1972 - Case MT/2024/2484 Wholesale physical and virtual infrastructure access market	23 February 2024
BoR (24) 78	BEREC Opinion on Meta's reference offer published in March 2024 to facilitate WhatsApp interoperability under Article 7 of the Digital Markets Act	04 June 2024
BoR (24) 101	BEREC draft Opinion on the national implementation and functioning of the general authorisation, and on their impact on the functioning of the internal market, pursuant to Article 122, paragraph 3 EECC	06 June 2024
BoR (24) 188	BEREC Opinion on the methodology for the mapping of QoS coverage of Connectivity Indicators for the DDPP	05 December 2024
BoR (24) 180	BEREC Opinion on the market and technological developments and on their impact on the application of rights of end-users in the EECC (Article 123)	05 December 2024
BoR (24) 190	BEREC Opinion on the national implementation and functioning of the general authorisation, and on their impact on the functioning of the internal market, pursuant to Article 122, paragraph 3 EECC	05 December 2024

- BEREC Reports

Document number	Description	Date
BoR (24) 38	30th BEREC International Roaming Benchmark Data and Monitoring Report	07 March 2024
BoR (24) 52	Draft BEREC Report on Cloud and Edge Computing Services	07 March 2024
BoR (24) 51	Draft BEREC Report on the entry of large content and application providers into the markets for electronic communications networks and services	07 March 2024

BoR (24) 40	BEREC Report on Member States' best practices to support the defining of adequate broadband internet access service	07 March 2024
BoR (24) 37	BEREC Summary Report of the Workshop on Internet Of Things: Perspectives and Competition	07 March 2024
BoR (24) 97	BEREC Analysis Monitoring of the Joint Statement agreed between Ukraine and EU Operators	06 June 2024
BoR (24) 102	BEREC Report on WACC parameter calculations according to the European Commission's WACC Notice of 6th November 2019 (WACC parameters Report 2024)	06 June 2024
BoR (24) 85	BEREC Report on the general authorisation and related frameworks for international submarine connectivity	06 June 2024
BoR (24) 83	Summary of the BEREC external Workshop on ex-ante regulatory experience concerning commitments, wholesale-only undertakings and commercial agreements review	06 June 2024
BoR (24) 82	BEREC Report on ICT sustainability for end-users: Empowering end-users through environmental transparency on digital products	06 June 2024
BoR (24) 80	BEREC Report on the Study Visit to Brazil 2024	06 June 2024
BoR (24) 96	Draft BEREC Report on M2M and permanent roaming	06 June 2024
BoR (24) 93	Draft BEREC Report on the IP Interconnection ecosystem	06 June 2024
BoR (24) 136	BEREC Report on Cloud and Edge Computing Services	03 October 2024
BoR (24) 139	BEREC Report on the entry of large content and application providers into the markets for electronic communications networks and services	03 October 2024
BoR (24) 140	Summary Report on the BEREC Workshop on end-user rights	03 October 2024
BoR (24) 137	Intra-EU communications BEREC Benchmark Report April 2023 - March 2024	03 October 2024
BoR (24) 151	Summary report: BEREC External Workshop about the Usage of Satellite Technologies in Mobile Communications	03 October 2024
BoR (24) 150	Draft BEREC Report on the evolution of private and public 5G networks in Europe	03 October 2024
BoR (24) 146	Implementation report on the BEREC Guidelines on Geographical surveys of network deployments	03 October 2024
BoR (24) 134	BEREC Report on the implementation of the Open Internet Regulation	03 October 2024
BoR (24) 177	BEREC Report on the IP Interconnection ecosystem	05 December 2024
BoR (24) 186	Draft Report on Infrastructure Sharing as a lever for ECN/ECS Environmental Sustainability	05 December 2024
BoR (24) 181	Draft BEREC Progress Report on managing copper network switch-off	05 December 2024

BoR (24) 187	BEREC Report on Connectivity Indicators for the Digital Decade Policy Programme	05 December 2024
BoR (24) 166	BEREC Report Regulatory Accounting in Practice 2024	05 December 2024
BoR (24) 167	Summary Report on BEREC internal workshop “Telecom regulators' role in the development and implementation of sustainability indicators in the ICT sector”	05 December 2024
BoR (24) 165	BEREC Report on M2M and permanent roaming	05 December 2024
BoR (24) 178	Draft BEREC Report on the regulation of physical infrastructure access	05 December 2024

- BEREC public consultations

Document number	Description	Date
BoR (24) 41	BEREC Report on the outcome of the public consultation on the draft BEREC Guidelines detailing Quality of Service Parameters	07 March 2024
BoR (24) 39	BEREC Summary report on the outcome of the public consultation on the draft BEREC Report on Member States’ best practices to support the defining of adequate broadband internet access service	07 March 2024
BoR (24) 84	BEREC Report on the outcome of the public consultation on the draft BEREC Report on the general authorisation and related frameworks for international submarine connectivity	06 June 2024
BoR (24) 81	BEREC Report on the outcome of the public consultation on the draft BEREC Report on ICT sustainability for end-users	06 June 2024
BoR (24) 138	BEREC Report on the outcome of the public consultation on the Draft BEREC Report on the entry of large content and application providers into the markets for electronic communications networks and services	03 October 2024
BoR (24) 135	BEREC Report on the outcome of the public consultation on the draft BEREC Report on Cloud and Edge Computing Services	03 October 2024
BoR (24) 189	BEREC Report on the outcome of the public consultation on the draft BEREC Opinion on the national implementation and functioning of the general authorisation, and on their impact on the functioning of the internal market, pursuant to Article 122, paragraph 3 EECC	05 December 2024
BoR (24) 164	BEREC Report on the outcome of the Public Consultation about the Draft BEREC Report on M2M and permanent roaming	05 December 2024
BoR (24) 176	BEREC Report on the outcome of the public consultation on the draft BEREC Report on the IP Interconnection ecosystem	05 December 2024

BoR (24) 182	BEREC Report on the outcome of the public consultation on the draft BEREC Work Programme 2025	05 December 2024

- Strategies, annual work programme and annual reports

Document number	Description	Date
BoR (24) 03	Outline BEREC Work Programme 2025	26 January 2024
BoR (24) 92	BEREC Annual Report for 2023	06 June 2024
BoR (24) 148	Draft BEREC Work Programme 2025	04 October 2024
BoR (24) 183	BEREC Work Programme 2025	05 December 2024

- Regulatory best practices (Common approaches/positions, Guidelines, Methodologies)

Document number	Description	Date
BoR (24) 62	Project Requirements Document for BEREC Guidelines on the coordination of civil works according to Art. 5(5) of the Gigabit Infrastructure Act	05 March 2024
BoR (24) 61	Project Requirements Document for BEREC Guidelines on access to in-building physical infrastructure according to Article 9 (6) of the Gigabit Infrastructure Act	05 March 2024
BoR (24) 42	BEREC Guidelines detailing Quality of Service Parameters	07 March 2024
BoR (24) 68	BEREC high-level position on artificial intelligence and virtual worlds	15 March 2024

- Other documents

Document number	Description	Date
BoR (24) 13	Voting report on the draft Outline BEREC Work Programme 2025	29 January 2024
BoR (24) 16	Voting report on the joint BoR and MB e-voting on the WA between BEREC and NCEC	01 February 2024
BoR (24) 15	Voting report on the joint BoR and MB e-voting on the Procedure to address requests of 3rd country NRAs to participate in BEREC	01 February 2024
BoR (24) 28	Voting report on the draft PRD for Input to the EC calls for contributions on AI	12 February 2024
BoR (24) 30	Voting report on the draft BoR decision on the appointment of the PFT WG Co-Chair	14 February 2024

BoR (24) 34	Voting report on the draft BEREC comments on draft ENISA Report on CPE Cybersecurity	15 February 2024
BoR (24) 33	Voting report on the Draft BEREC Opinion on Meta's draft reference offer to facilitate WhatsApp interoperability under Article 7 of the DMA	15 February 2024
BoR (24) 60	Voting report on the BEREC Opinion on Phase II case MT 2024/2484	23 February 2024
BoR (24) 67	Voting report on the draft Ad-hoc PRDs for FNE WG on BEREC Guidelines under the GIA	06 March 2024
BoR (24) 76	Voting report on the BEREC high-level position on artificial intelligence and virtual worlds	15 March 2024
BoR (24) 111	Voting report on the draft BEREC Opinion on Meta's reference offer published in March 2024 to facilitate WhatsApp interoperability under Article 7 of the Digital Markets Act	05 June 2024
BoR (24) 126	Voting report on the draft BEREC's input to the EC public consultation on the White Paper "How to master Europe's digital infrastructure needs"	28 June 2024
BoR (24) 131	Voting report on the BoR decision on the approval of the BEREC's self-assessment tool for NRAs' independence	20 August 2024

Annex 9 – Board of Regulators electronic voting procedures

Subject	Comments round Date/link to documents	Voting round Date/link to documents
Draft Outline BEREC Work Programme 2025	17 January 2024	24 January 2024
Procedure to address requests of 3rd country NRAs to participate in the work of the Body of European Regulators for Electronic Communications (BEREC)	18 January 2024	26 January 2024
WA concerning participation of the NRA of Ukraine in the work of BEREC and BEREC Office	22 January 2024	26 January 2024
Draft PRD for Input to the EC calls for contributions on AI	07 February 2024	08 February 2024
Draft Decision of the BoR on the appointment of the PFT WG Co-Chair	06 February 2024	09 February 2024
Draft BEREC comments on draft ENISA Report on CPE Cybersecurity	09 February 2024	14 February 2024
BEREC Opinion on Meta reference offer under Article 7 of DMA	12 February 2024	14 February 2024
Preliminary Draft BEREC Opinion on Phase II case MT 2024/2484	16 February 2024	22 February 2024
Draft Ad-hoc PRDs for FNE WG under Gigabit Infrastructure Act	27 February 2024	01 March 2024
BEREC high-level position on artificial intelligence and virtual worlds	08 March 2024	14 March 2024
Draft BEREC Opinion on Meta's reference offer published in March 2024 to facilitate WhatsApp interoperability under Article 7 of the Digital Markets Act	24 May 2024	31 May 202
Draft BEREC's input to the EC public consultation on the White Paper "How to master Europe's digital infrastructure needs?"	20 June 2024	27 June 2024
BoR decision on the approval of the BEREC's self-assessment tool for NRAs' independence	05 August 2024	13 August 2024

Annex 10 – List of abbreviations/acronyms

BEREC: Body of European Regulators for Electronic Communications

BoR: Board of Regulators

CAPs: Content and Application Providers

CAPM: Capital Asset Pricing Model

CDN: Content Delivery Networks

CN: Contact Network

CSP: Communications Service Providers

DA: Digital Act

DESI: Digital Economy and Society Index

DMA: Digital Markets Act

DOCSIS: Data Over Cable Service Interface Specification

DSA: Digital Service Act

EaPeReg: Eastern Partnership Electronic Communications Regulators Network

EC: European Commission

ECS: Electronic Communications Services

ECN: Electronic Communications Networks

EEA: European Economic Area

EECC: European Electronic Communications Code

ENISA: European Union Agency for Network and Information Security

EoI: Equivalence of Inputs

ERP: Equity Risk Premium

ERGA: European Regulators Group for Audiovisual Media Services

ERT: Economic Replicability Test

EU: European Union

FDC: Fully-Distributed Costs

FTTB: Fibre-To-The-Building

FTTC: Fibre-To-The-Cabinet

FTTP: Fibre-To-The-Premises

GIS: Geographic Information System

GS GL: Geographical Surveys Guidelines

IAS: Internet Access Services

ICS: Interpersonal Communication Services

IP: Internet Protocol interconnection

ISP: Internet Service Provider

ITRE: European Parliamentary Committee on Industry, Research and Energy

ITU: International Telecommunications Union

LLU: Local Loop Unbundling

LTE: Long-Term Evolution

MNO: Mobile Network Operator

MVNO: Mobile Virtual Network Operator

NCA: National Competition Authority

NGA: Next Generation Access

NI-ICS: Number-Independent Interpersonal Communication Services

NIS: Network and Information Systems

NRA: National Regulatory Authority

NTP: Network Termination Point

OCA: Other Competent Authority

QoS: Quality of Service

OTT: Over-the-top

REGULATEL: Latin American Forum of Telecommunications Regulators

RFR: Risk Free Rate

RSPG: Radio Spectrum Policy Group

SMP: Significant Market Power

SMS: Short Message Service

TD: Top-down

ULL: Unbundled Local Loop

VDSL: Very-High-Bit-Rate Digital Subscriber Line

VHCN: Very High Capacity Network

VPN: Virtual Private Network

VULA: Virtual Unbundled Local Access

WACC: Weighted Average Cost of Capital