Body of European Regulators for Electronic Communications

BEREC

BoR (21) 70

BEREC Annual Reports for 2020

10 June 2021

Contents

Foreword by the BEREC Chair 2020

BEREC's activities in 2020 should be viewed in the light of COVID-19. BEREC has long been used to holding digital meetings, primarily at working group level. However, the need to adjust all meetings, including at decision-making level, became clear in March 2020. All meetings were made virtual overnight, and the management structure was adjusted. I am proud to say that BEREC managed to carry out its activities laid down in the Work Programme as well as additional tasks despite this situation. The experiences will stay with us for the future and have a positive impact on our working methods. At the same time there are limits to how an organisation like BEREC can develop with only virtual meetings, as interaction between national regulatory authorities (NRAs) is essential and a core value of the cooperation.

A major focus for BEREC in 2020 was to assist in keeping the European electronic communication networks and markets well-functioning during the COVID-19 pandemic, in particular monitoring the performance of networks and operators across Europe as well as coordinating information for the European Commission. Data collection and reporting started on a weekly basis. In addition, BEREC set up an information gathering and sharing exercise on the various measures implemented to mitigate any adverse consequences in Europe, for example relating to changed usage patterns, inability to pay bills or the use of different tracing applications.

Implementation of the new Electronic Communications Code (EECC) continued to be at the forefront of BEREC's work, with decisions on a number of Guidelines in the first half of 2020. In addition to the task of developing guidelines, BEREC was also required to provide its opinions to the Commission on a number of ancillary legislative initiatives. In 2020 BEREC also revised its strategic objectives and decided on a new Strategy. Although BEREC's main focus was on the tasks assigned to it by the co-legislators, BEREC was nonetheless aware of the fact that it needed to remain informed of developments within the telecoms sector and any adjacent sectors underpinned by the telecoms sector. In line with this, BEREC responded to the public consultations on the Digital Service Act package and the New Competition Tool. BEREC also initiated a study on consumer behaviour towards digital platforms as a means of communication. In addition, BEREC did substantial work on security issues in relation to 5G networks.

I would also like to mention the BEREC statement on independence, where BEREC shared concerns on the measures taken by some Member States that could hamper the independence of NRAs. BEREC emphasises that the independence of the NRAs is of paramount importance for impartial and effective decision-making in order to safeguard the internal market, promote sustainable competition, foster efficient investment and protect the interests of the citizens of the European Union. BEREC invited the Commission to continue to monitor developments and proactively guard against any action that undermines the NRAs' ability to carry out their activities, as foreseen in the EECC.

In 2020 there was special cooperation with other bodies and networks. BEREC and the Organisation for Economic Co-operation and Development (OECD) organised a joint webinar on 'Quality of Service and Experience'. On behalf of BEREC, I had the honour and pleasure to chair the International Telecommunications Union Global Symposium for Regulators (ITU GSR). BEREC and the Radio Spectrum Policy Group (RSPG) adopted a joint position

paper on spectrum-related electromagnetic field issues. In addition, BEREC and ENISA jointly organised a virtual workshop on 5G cybersecurity toolbox developments. Furthermore, BEREC cooperated with several other European organisations as well as our international partners under the memorandum of understanding between BEREC and the ITU.

BEREC also needed to adjust its engagement with stakeholders in 2020. Despite the COVID-19 pandemic, BEREC managed to proactively engage with stakeholders, launching 10 public consultations and hosting external workshops on a wide range of topics. These practices established a new way of operating, which will be carried forward and expanded in the future. Combining virtual meetings with physical meetings is likely to be a lasting method of stakeholder engagement.

The results of 2020 demonstrate BEREC's ability to deliver on its commitments, and further highlight its vital role in contributing to the consistent application of the regulatory framework as well as its role as an independent advisory body for the co-legislators. The situation in 2020 confirmed the success of the BEREC structure, showing the dedication, knowledge and competence of the Working Group Co-Chairs and experts drawn from all NRAs, who strove to achieve the best outcomes, and the commitment of the Contact Network members and members of the Board of Regulators. Moreover, the good working relationship with the BEREC Office is a core value of the cooperation.

Many thanks to all!

Dan Sjöblom

BEREC Chair 2020

PART A: Annual Report on developments in the electronic communications sector in 2020

Annual Report on developments in the electronic communications sector in 2020, in accordance with Article 4(1)(j)(v) of Regulation (EU) No 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 Reports 2020 highlight the key developments and market trends in the electronic communications sector in Europe over the past 12 months, focusing on market dynamics and the development of European Union public policies and regulatory practices. The report presents the perspectives of BEREC, based on the expertise and knowledge of the member national regulatory authorities (NRAs).

In addition, the report describes BEREC's own contribution to the development of the electronic communications sector in Europe. The analysis presented in this report includes qualitative reasoning, based on information from BEREC Working Group (WG) activity, and quantitative data, based on periodic BEREC data collection exercises and other public documents.

During the 2 years following the adoption of the Code, BEREC worked intensively on the transposition process, through the approval and publication of a considerable number of guidelines for the harmonised and effective application of the Code to ensure consistent and predictable application of the rules throughout the digital single market.

One of BEREC's priorities for 2020 was 5G and Very High Capacity Networks (VHCN), and several working groups were devoted to this priority. In this regard the core activity of BEREC in 2020 was to finalise and publish the various Guidelines foreseen to be delivered by BEREC according to the Code, namely the BEREC Guidelines on very high capacity networks according to Article 82 (EECC) and the BEREC Guidelines on the consistent application of the conditions and criteria for assessing co-investments in new very high capacity network elements according to Article 76 (EECC), as well as the Article 22 (EECC) Guidelines for geographical surveys of network deployments. Furthermore, BEREC published the Guidelines on symmetric regulation according to Article 61.3 (EECC), as well as the Guidelines on the identification of the network termination point according to Article 61.7 (EECC). Finally, BEREC published Guidelines on the quality of service parameters according to Article 104 (EECC).

As a result of the pandemic, it is clear that the economic growth seen in Europe over the past 5-6 years has been forced to slow down. Real GDP contracted by almost -7% in the 12 months to December 2020. While BEREC collects telecom revenue data from across the European Union, the data currently available to NRAs is typically only confirmed until December 2019 (from 2016). That data already shows that the European average fell by more than 4% during those 3 years.

BEREC's work in 2020 must also be viewed in the light of COVID-19. Despite the difficulties that the pandemic presented, BEREC was able to conduct its work virtually and complete its Work Programme 2020 in an efficient and professional manner. Given the work on the European Electronic Communications Code (EECC) already carried out in 2019, BEREC continued to move ahead with this work in 2020. However, in addition to this obligatory work, one major focus for BEREC during the year was to contribute to the functioning of European electronic communications networks and markets, even as the pandemic brought much economic activity to a standstill. BEREC's work in this area included the coordination of information on the monitoring and performance of networks for the European Commission. This resulted in a regular reporting mechanism to highlight what measures NRAs (in particular) and, indeed, operators implemented to mitigate any adverse consequences of the pandemic in Europe.

The pandemic also had an impact on the national processes for the transposition of Directive 2018/1972 (the European Electronic Communications Code, EECC), which had been expected by 21 December 2020. The European Commission sent letters of formal notice to 24 Member States in February 2021, asking them to adopt and notify their national transposition measures.

The importance of high-speed connectivity has, perhaps, never been more obvious than over the past 12 months as many businesses (particularly office-based) switched to either a full virtual set-up or a hybrid arrangement of virtual and physical. 5G is one of BEREC's strategic priorities. The challenges that BEREC addresses in its work range from work on standards, interoperability, new business models, spectrum availability and network sharing, coverage, Quality of Service (QoS), security and resilience.

The fixed and wireless networks are essential infrastructure in Europe, even more so in times of crises. Therefore, the recent misinformation about electromagnetic fields (EMFs) and 5G may act as a barrier to the timely rollout of 5G networks. To address these challenges, a joint BEREC and Radio Spectrum Policy Group (RSPG) statement was drawn up during the year in which both groups strongly support measures to protect the public and workers from the harmful effects arising from exposure to EMFs.

Consolidation through mergers and acquisitions (M&As) continued in the European electronic communications services (ECS) markets in 2020. This consolidation process showed a trend away from mostly fixed or fixed/mobile mergers towards M&As in the telecoms infrastructure sector. The majority of M&As, as in recent years, have been national in scope, implying that a majority of concentration operations aimed to increase firms' market position in a national market, of an EU Member State rather than to extend its footprint to cover additional countries. However, there was nevertheless a significant share of transnational M&As, most notably in the telecoms infrastructure sector.

Before 2020, BEREC was already considering sustainability issues, but during this year, given the circumstances related to COVID-19, BEREC proceeded to address the issues particularly relating to the technical operations of BEREC and the BEREC Office, including a new Expert Networking Group (ENG) to make proposals on sustainability for BEREC. In accordance with the newly drafted BEREC 2021-2025 Strategy and in the context of the European Green Deal policy initiatives by the European Commission, BEREC considered that the ENG should assess the

wider remit of the work carried out by BEREC and the NRAs in the digital sector, in particular regarding the environmental impact of electronic communications networks.

In order to position BEREC in relation to the European Commission's expectations on the sustainability of electronic communication network and services, and to assess whether or not there is scope within the regulatory actions of NRAs to positively impact or minimise the negative impact of the sector on the environment, the ENG focused on developing the knowledge of the NRA experts and BEREC of the environmental impact of the digital sector.

1. Introduction

BEREC's Work Programme 2020 had much the same focus as in 2019 on the mandatory tasks falling to BEREC, as set out in the European Electronic Communications Code (EECC). However, due to the COVID-19 pandemic, 2020 also required BEREC to be flexible and adapt to new tasks and priorities that had not been foreseen when the Work Programme was finalised. The year also ended with the withdrawal of the United Kingdom (UK) from the European Union, and although the UK was still a Member State in 2020, Ofcom (the NRA) no longer participated in BEREC throughout the year. Since it was likely that data would not be available in all cases, only EU-27 data is shown.

Monitoring the capacity on internet access services and the updated priorities of the Digital Strategy by the new European Commission were examples of BEREC's new tasks and priorities. BEREC nevertheless delivered on all its planned commitments in the Work Programme for 2020 and set out a new 4-year Strategy for the period 2021-2025.

BEREC closely monitors and reports on market developments in the electronic communications sector and publishes its annual report on sector developments 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). The following analysis looks at the developments in the sector in 2020, paying particular attention to market and regulatory trends, the openness of the internet and framework review challenges, as well as international roaming, termination rates and regulatory accounting. This report presents BEREC's view, based on its members' expertise and knowledge, and, at the same time, describes BEREC's own contribution to the development of the sector. The analysis includes qualitative reasoning, based on information from the activities of BEREC Working Groups (WGs), and quantitative data, based on periodic BEREC data collection exercises and other public documents.

2. BEREC study on consumer behaviour and attitudes towards digital platforms

The rapid growth of digital platforms has drawn the scrutiny of regulators all over the world. Regulators and policy-makers are discussing how market power is distributed if the current competition policy remains valid for this situation, and how any bottlenecks can be addressed in relation to digital platforms. BEREC therefore found it essential to obtain a better understanding of consumers' views on digital platforms and their role as providers of communication services, such as interpersonal communication and the interactive exchange of information.

To gain a better understanding of how consumers perceive, use and value services provided by digital platforms, BEREC decided to commission a study to obtain new insight into European consumers' perceptions, attitudes and behaviour in relation to digital platforms, and thus make a contribution to the wider discourse and policy discussion on digital platforms.

Although this study is to be finalised in 2021, the interim results already show that:

- the use of digital platforms reveals patterns of both substitution and complementarity for consumers in relation to traditional electronic communication services;
- despite the trend towards multi-homing, consumers' behaviour on their main messenger apps is surprisingly stable – multi-homing is generally happening within the same ecosystem of services, i.e. means of communication belonging to the same company;
- the three most important reasons for using a specific platform to communicate are: network effects (respondents' families or friends use it), convenience and the fact that the use is free of charge;
- although there is generational difference in attitudes toward privacy, consumers of all demographics tend to lack sufficient knowledge about personal data collection, and even fewer are comfortable with the data practices applied by app service providers;
- despite some concerns surrounding privacy issues, European consumers are using communication services provided by digital platforms to a growing extent, and there is a similar pattern all over Europe.

The findings of the study will contribute to BEREC's work on digital platforms and other related areas.

3. Market trends

3.1 Economic context

After 6 years of economic growth, real GDP in the European Union declined by -6.6%[1] in 2020 owing to the COVID-19 crisis. This means that last year the world, including Europe, faced the worst decline since the Great Depression of the 1930s. In this context, despite the sharp decreases in manufacturing and trade in March and April, the total loss of industrial production between February and December amounted to 2%, while the intra-Euro area trade growth of 2020 dropped to 8.9%.

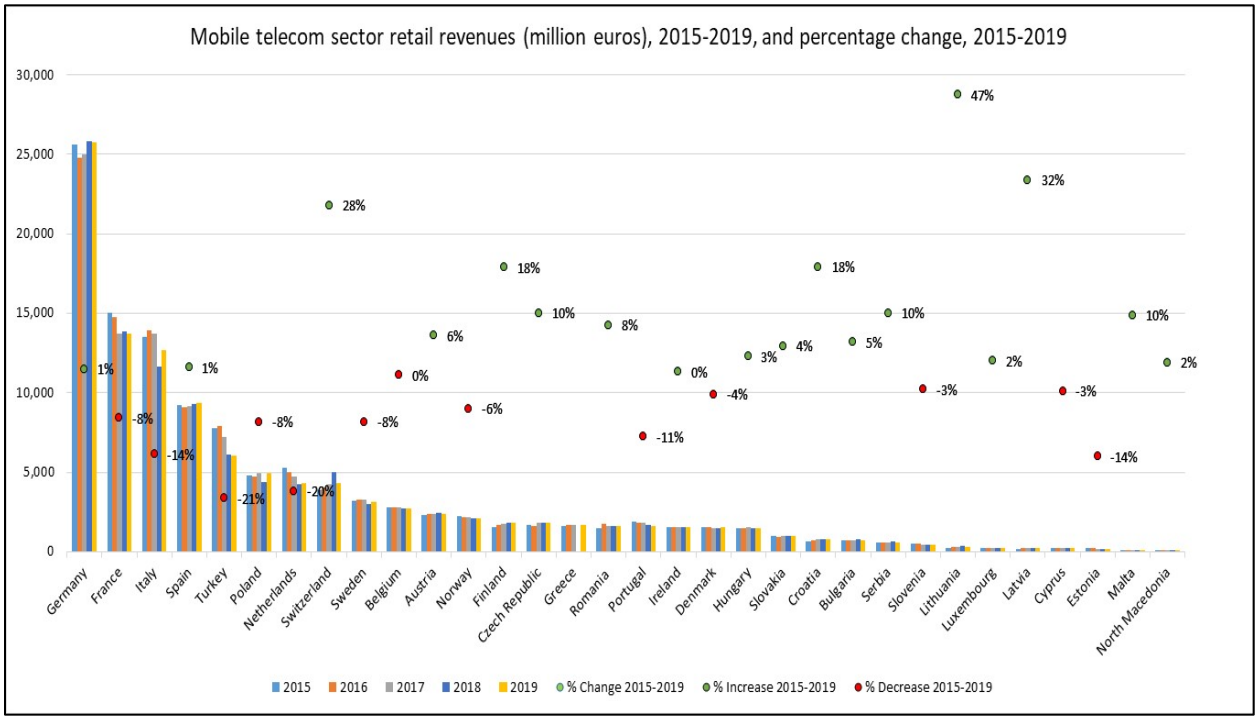
Regarding the telecom sector, the pandemic is precisely the reason why some NRAs were unable to provide forecasts for 2020, and therefore our analysis is based on the period 2016-2019. Already for this period, average retail revenue for the EU-27[2] fell by 4.12%, mainly due to the drop in mobile retail revenue of some countries, such as France, Italy and the Netherlands, which carry weight in total revenue.

[1] https://ec.europa.eu/eurostat/databrowser/view/tec00115/default/table?lang=en

[2] The EU-27 is referred to here as data was collected in early 2021, when the United Kingdom had already left the European Union (Brexit) and it was decided that no data be requested from Ofcom, the United Kingdom NRA.

Figures 1 and 2 below present fixed and mobile retail revenue, respectively, between 2016 and 2019 for 32 European countries and EU-27 (excluding Greek data) average. Figure 1 shows that retail revenue in the mobile communications sector remained flat for 8 countries, grew for 12 and declined for 11. According to the NRA data, mobile retail revenue increased substantially in Lithuania, Latvia, Croatia and Finland, while in the Netherlands, Estonia, Italy and Portugal they fell by more than 10% in the same period.

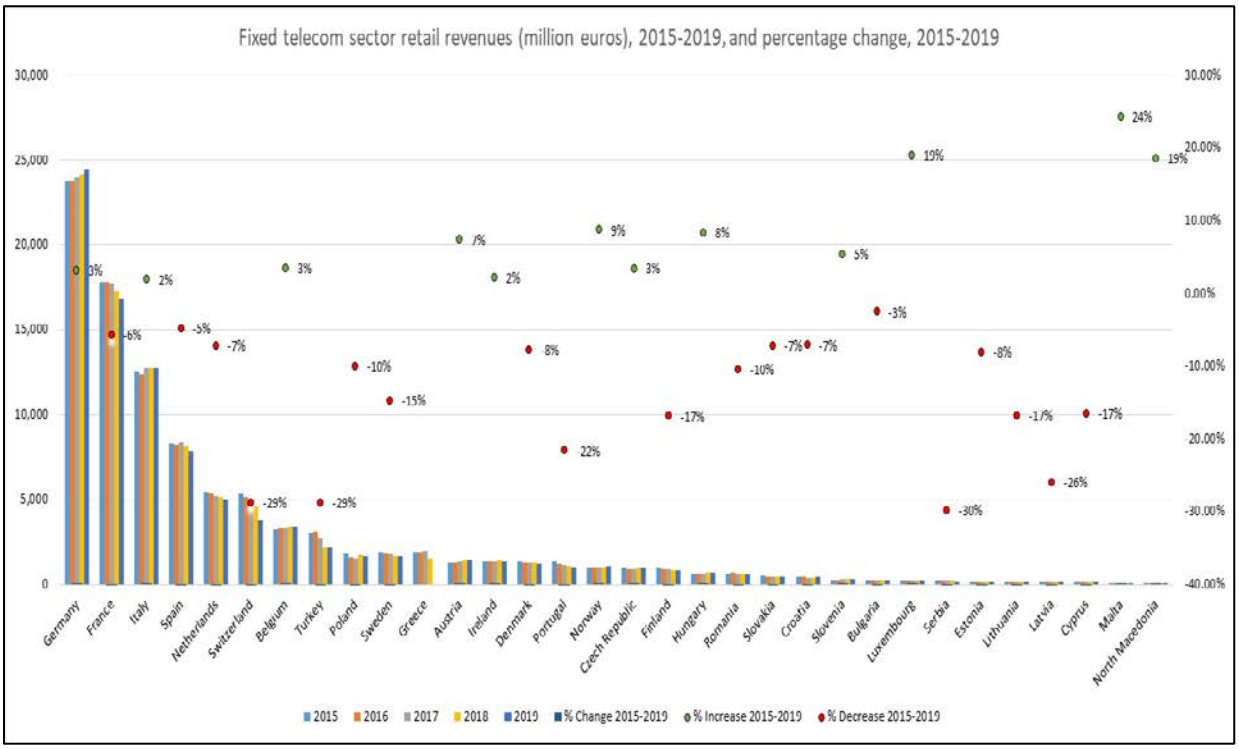
Figure 1: Mobile telecom sector retail revenue (in EUR million) and percentage change 2015-2019



Source: BEREC.

On the other hand, Figure 2 shows that retail revenue in the fixed communications sector either remained constant or grew between 2016 and 2019 for 11 of the 31 countries analysed. However, for 19 countries this revenue fell, and in 10 of these cases the variation was above 18%. According to the data provided by NRAs, fixed retail revenue in Luxemburg and Malta grew by over 15% during this period, while in Latvia and Portugal it fell by more than 21%.

Figure 2: Fixed telecom sector retail revenue (in EUR million) and percentage change 2015-2019



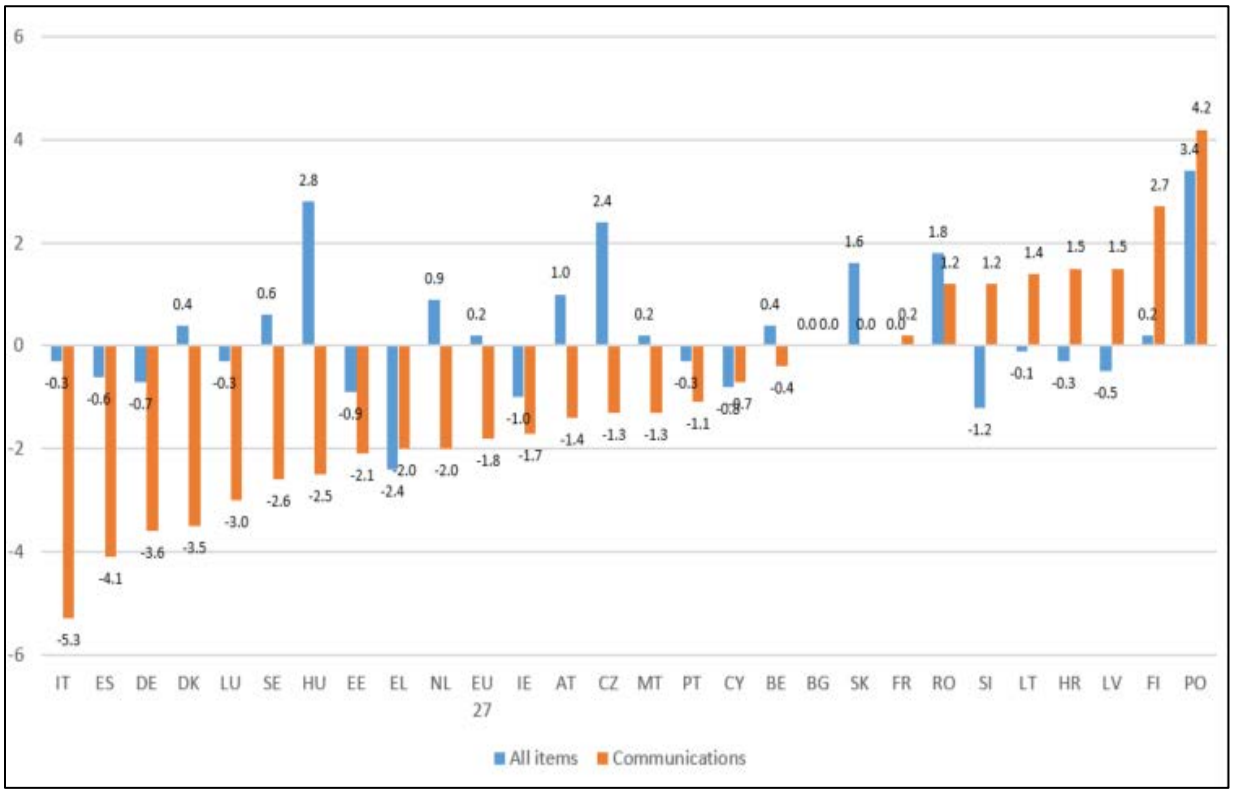
Source: BEREC.

Figure 3 below illustrates the change in the overall Harmonised Index of Consumer Prices (HICP) and the communications subcomponent between December 2019 and December 2020. The most notable reductions in communication prices for consumers were in Italy (-5.3%), Spain (-4.1%) and Germany (-3.6%). In contrast, the most notable increases in communications prices for consumers were in Poland (+4.2%) and Finland (+2.7%).

Overall, for the EU-27[3], according to Eurostat data, communications prices in 2020 decreased by 1.8%, while the overall HICP actually increased in the same period by 0.2%.

[3] The EU-27 is referred to here, despite the data referring to end-2020 when the UK was still a member of the European Union.

Figure 3: EU-27 percentage change (January-December 2020) in the HICP and the communications subcomponent



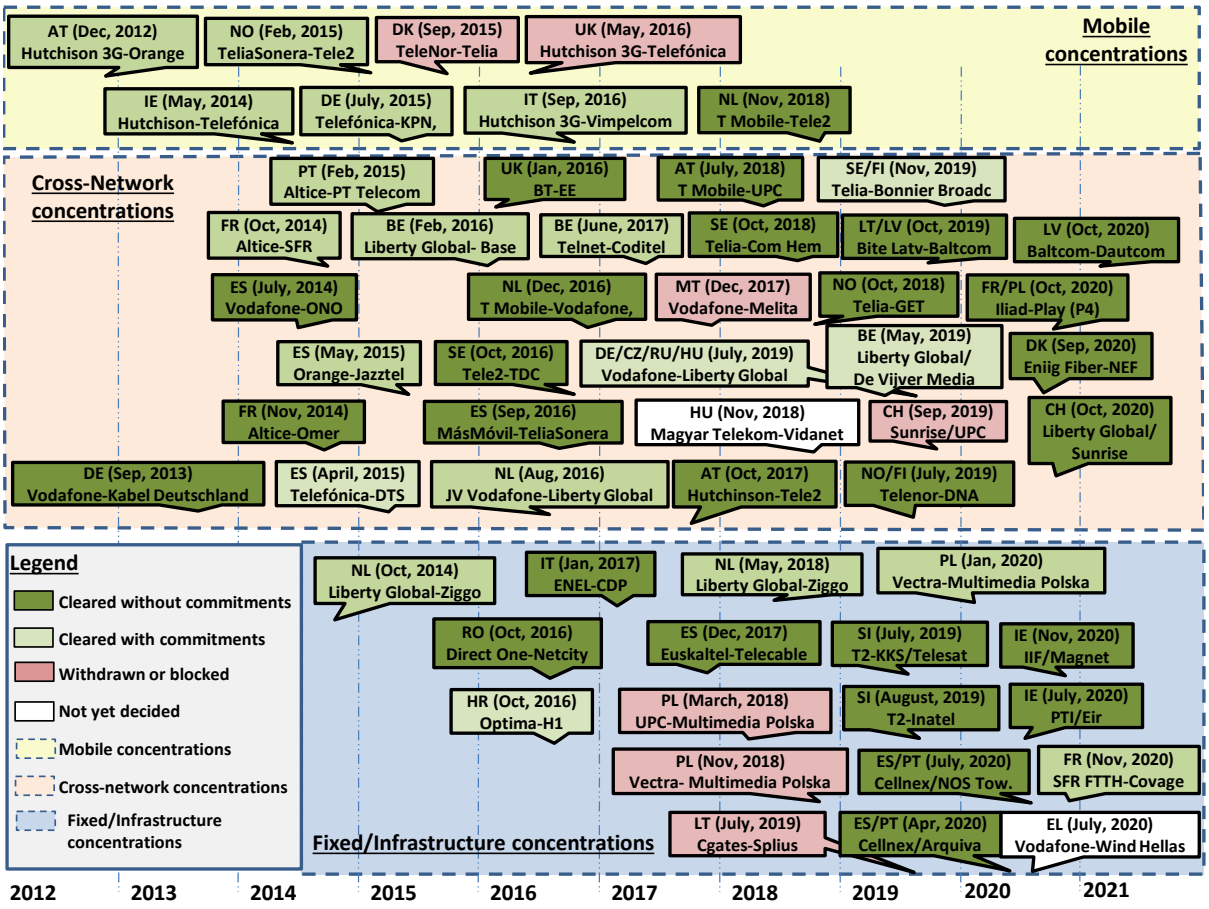
Source: Eurostat and national statistics offices.

3.2 Mergers and acquisitions

Consolidation through mergers and acquisitions (M&As) continued in the European electronic communications services (ECS) markets in 2020. This consolidation process showed the trend of a move away from mostly fixed or fixed/mobile mergers towards M&As in the telecoms infrastructure sector. Fixed/mobile M&As are motivated by the need to compete in a convergent scenario where telecommunications operators provide bundled and integrated services over their own fixed and mobile infrastructures, while the latter might point to a 'de-verticalisation' of markets and the emergence of independent infrastructure operators.

The majority of M&As, as in recent years, have been national in scope, implying that a majority of concentration operations were aimed at increasing firms' market positions in a national market of an EU member state, rather than to extend its footprint to cover additional countries. However, there was nevertheless a significant share of transnational M&As, most notably in the telecoms infrastructure sector.

Figure 4: Mergers and acquisitions in Europe 2012-2020



Source: BEREC.

Figure 4 above shows that the majority of M&As in 2017-2020 were cleared by the relevant competition authorities, although some of them were subject to specific commitments designed to ensure that effective competition would not be significantly reduced as a result of the concentration.

Mobile concentrations were predominant in 2010-2015 when the mobile sector went through a period of intense M&A activity. The parties involved in some of the mergers and acquisitions were usually mobile network operators (MNOs) retailing similar mobile services within the same country or, in other cases, mobile virtual network operators (MVNOs) merged or were acquired by MNOs. The most interesting M&As and most significant (in terms of financial volume) were mergers between MNOs. As shown in Figure 4, four of the transactions involving MNOs were cleared in the EU between 2012 and 2016, one was withdrawn in 2015 (Denmark) and another was blocked in 2016 (United Kingdom, see below for more recent developments).

The acquisition of Tele2 by T-Mobile in the Netherlands was cleared in November 2018. Most of these transactions resulted in the number of operators falling from four to three MNOs (namely the M&As in Austria in 2013, Ireland in 2014, Germany in 2015 and the Netherlands in 2018).

Tele2-T-Mobile merger was the first case in which the European Commission unconditionally cleared a four-to-three mobile merger since T-Mobile's acquisition of Orange Netherlands in 2007. This decision differed from seemingly similar mergers that recently involved Hutchison 3G in Austria in 2012, Ireland in 2014, the UK in 2016 and Italy in 2016. However, the consolidation trend (at national level) in the mobile sector has receded in the past years and no mergers between MNOs were notified or cleared in 2019 and 2020.

However, relevant legal proceedings concerning mergers of MNOs took place in 2020 around the 2016 decision of the European Commission prohibiting the acquisition by Hutchison 3G UK (Three) of Telefónica UK (O2), two of the four largest MNOs in the UK. In May 2020, the European General Court (EGC) annulled the 2016 Commission decision, which the European Commission has decided to appeal before the European Court of Justice (ECJ) in August 2020.

The decision of the EGC has been interpreted in the sense that it will make it more difficult for the Commission to block mergers that fall short of creating or strengthening a dominant player, even if a market is already relatively concentrated. Therefore, the appeal will be closely monitored, and the ECJ's ruling is expected to set a significant precedent with an outcome that could potentially lead to wider reviews in the Commission's approach to merger assessment.

Cross-network concentrations can be classified into two categories: (1) mobile operators that have acquired fixed operators (e.g. Hutchinson's 2017 acquisition of the Tele2 branch in Austria and T-Mobile´s 2018 acquisition of UPC Austria); (2) integrated or fixed operators acquiring other integrated operators. In the past, cross-network M&As were generally cleared, many without further commitments.

This was also the case in 2020 with the acquisition of Latvian telecoms operator and pay TV provider Baltcom by the Lithuanian telecoms operator Bite Latvija, which was notified in 2019 and unconditionally cleared in February 2020. The Latvian National Competition Authority did not identify risks in relation to horizontal overlaps in the retail telecoms and pay TV markets. Following the acquisition, Baltcom/Bite acquired local fibre operator Dautkom TV which was equally cleared unconditionally by the Latvian NCA.

In the cleared acquisition of Play Communications, the holding company of Polish mobile network operator (MNO) P4, by French telecoms operator Iliad, a transnational cross-network acquisition was unconditionally cleared by the European Commission as it did not identify horizontal overlaps between the operators' activities since they are active in different countries. In more legal proceedings, appeals are pending against a major decision of the European Commission taken in 2019 to clear the cross-network acquisition of Liberty Global's cable operations in Germany (Unitymedia) by Vodafone.

This transaction also included Liberty Global's cable operations in the Czech Republic, Hungary and Romania. The appeals before the EU General Court against the Commission decision were launched by German telecoms operator Deutsche Telekom (DT) and regional German cable operator Tele Columbus and NetCologne.

Fixed/infrastructure concentrations were increasingly notified and cleared in 2020. Notable were Spanish-based Cellnex's transnational acquisitions of NOS Towering, a subsidiary of

Portuguese mobile network operator NOS, and of Arqiva's telecoms infrastructure division in the UK. Cellnex's expansion in the market for macro sites (passive large telecoms infrastructure) as well as small cell sites (small-area wireless access points) could potentially show a rising trend for concentrations in the sector. Two 2020 transactions in the Irish market, Phoenix Tower International's (PTI) acquisition of wireless towers owned by telecoms operator Eir and the acquisition of Magnet Networks by Speed Fibre, a wholly-owned holding company of the Irish Infrastructure Fund (IIF), point in the same direction. All four acquisitions were cleared unconditionally by the respective NCAs in Portugal, the UK and Ireland.

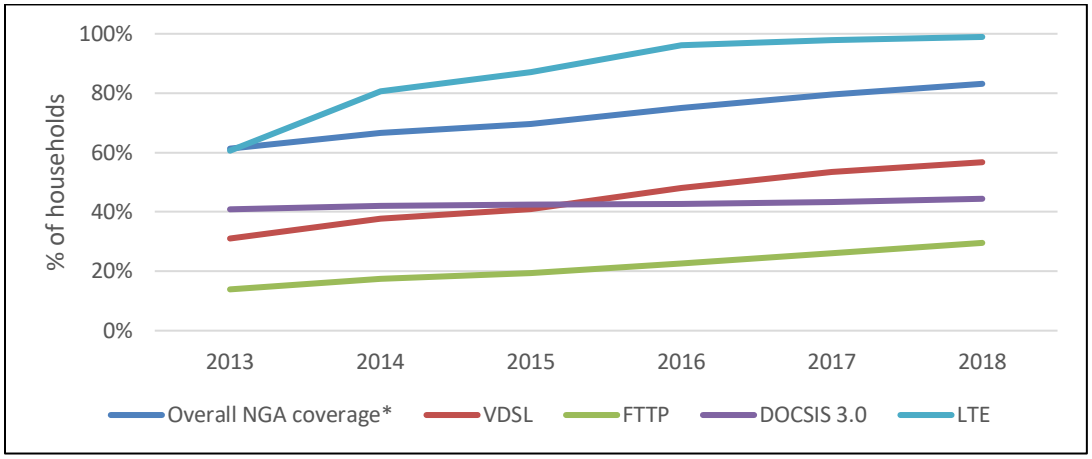
Another similar infrastructure concentration at national level, the merger of the passive mobile network infrastructure of Greek MNOs Vodafone-Panafon (Vodafone Greece) and Wind Hellas was notified in July 2020, but a decision by the Greek NCA is still pending. It seeks to combine the network infrastructure under the company Vantage Towers Greece, with Vodafone Greece gaining majority control. Another merger, in the wholesale market for fixed line broadband (fibre-to-the-office access networks), was cleared conditionally by the European Commission in November 2020 with the acquisition of French wholesale-only fibre operator Covage by SFR FTTH (Altice). As Covage directly competes with SFR on these markets, the Commission only approved the acquisition by SFR on condition that comprehensive divestments were made to ensure competition.

3.3 Broadband and Next-Generation networks

Total Next-Generation Access (NGA) coverage in the EU increased significantly between 2013 and 2019, from 61% of households to 86%, according to the study on broadband coverage in Europe 2019 and its predecessors commissioned by the European Commission (see Figure 5). This increase mainly came from growth in VDSL and FTTP coverage, while cable (DOCSIS 3.0) coverage was fairly constant during this period.

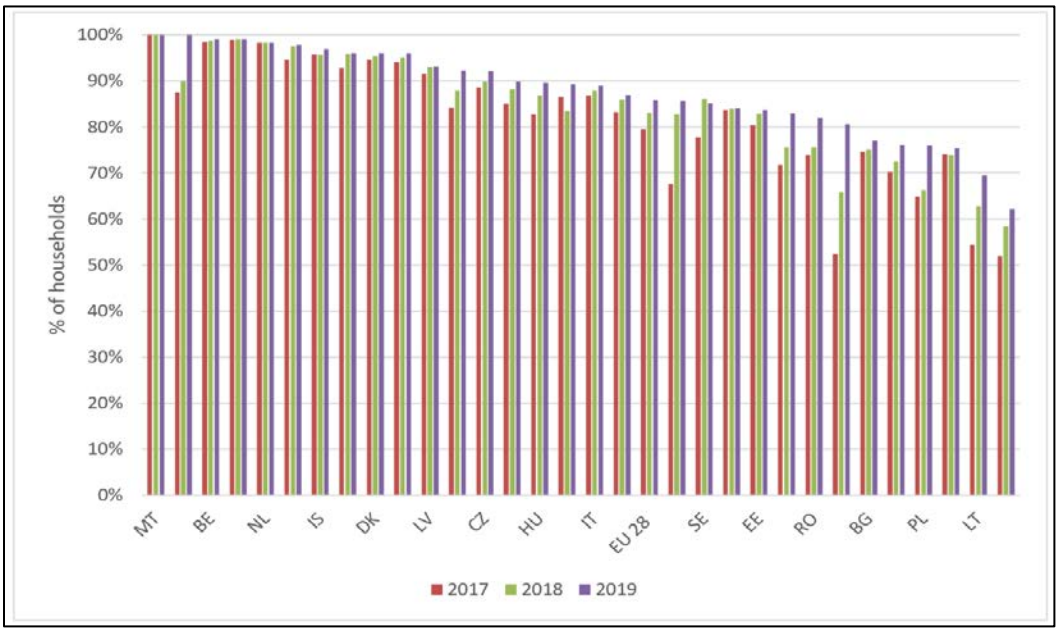
Looking at mobile networks, long-term evolution (LTE) was rolled out from around 60% coverage to 99% during this period. From 2013 to 2019, NGA and FTTP coverage increased fairly steadily and on average by 4.1% points (NGA) and 3.3% points (FTTP) per year, while the VDSL coverage increase varied between 2.5% points (2019) and 7.2% points (2016) per year.

Figure 5: Development of LTE and NGA coverage in the EU by technology 2013-2019



Source: Broadband coverage in Europe 2019[4] and EU Study on Broadband Coverage in Europe 2018[5].

Figure 6: Development of NGA coverage by country 2017-2019

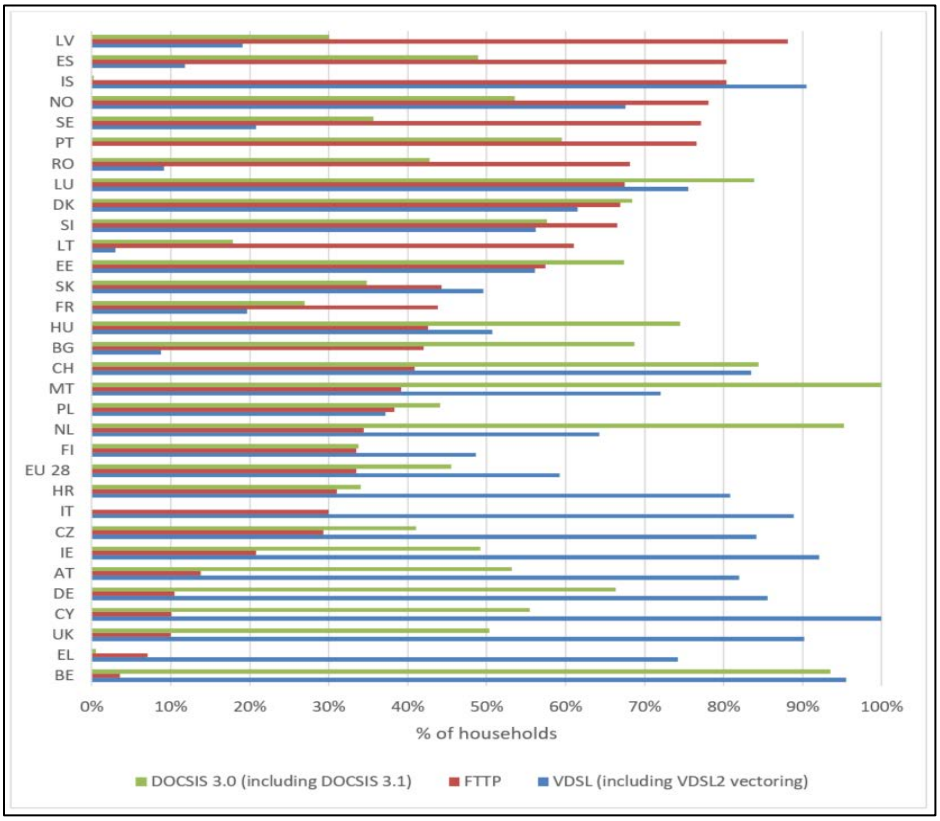


Source: Broadband coverage in Europe 2019[6].

[4] https://op.europa.eu/en/publication-detail/-/publication/077cc151-f0b3-11ea-991b-01aa75ed71a1
[5] https://ec.europa.eu/digital-single-market/en/news/study-broadband-coverage-europe-2018
[6] https://op.europa.eu/en/publication-detail/-/publication/077cc151-f0b3-11ea-991b-01aa75ed71a1

With regard to country level data, Figure 6 shows that there were particularly large increases in NGA coverage in Greece (28% points), Croatia (18% points), Lithuania (15% points), Cyprus (13% points), Portugal (11% points) and Poland (11% points) between 2017 and 2019. These increases can be attributed mainly (but not only) to a growth in VDSL coverage. The strongest increases in FTTP coverage can be observed in Norway (26% points), Iceland (17% points) and Malta (16% points), followed by Hungary (16% points) and France (15% points). Coverage with different technologies still varies widely within the EU. Figure 7 below shows that the coverage of each of the three main NGA technologies, VDSL (including VDSL2 vectoring), FTTP and DOCSIS 3.0 (including DOCSIS 3.1), varies between a minimum of 0-4% and maximum of 88-100% across the countries listed. With regard to FTTP coverage, Latvia was the leading country in 2019, followed by Spain, Iceland, Norway and Sweden.

Figure 7: NGA coverage by technology and country 2019



Source: Broadband coverage in Europe 2019[7]*.*

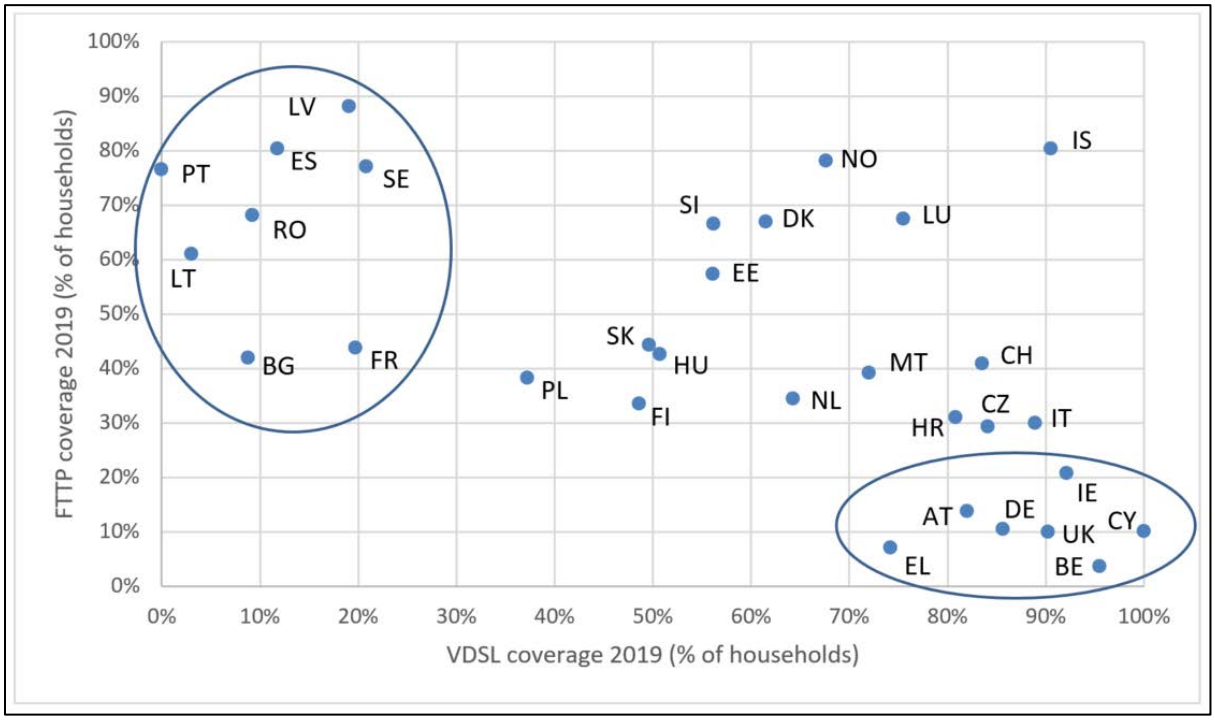
Regarding the relationship between FTTP coverage and VDSL coverage, Figure 8 shows that there are still countries with a clear focus on either FTTP or VDSL. As already discussed in the

[7] https://op.europa.eu/en/publication-detail/-/publication/077cc151-f0b3-11ea-991b-01aa75ed71a1

2016 report *Challenges and drivers of NGA rollout and infrastructure competition* (BoR (16) 171), FTTP dominates where either a widespread duct network of the incumbent is available (such as in France, Lithuania, Portugal and Spain) or the copper network is historically less developed (e.g. in Bulgaria and Romania)[8].

On the other hand, the incumbent pursues a VDSL strategy mainly in countries where no or few ducts are available (leading to high costs of FTTP rollout), and the copper network is well suited for the rollout of fibre to the cabinet. Examples of such countries are Austria, Belgium, Germany, Greece, Ireland and the United Kingdom. This may also lead to differences in regulatory approaches, with a focus on duct regulation in the first group and a focus more on virtual products (virtual unbundled local access (VULA)) in the second group[9]. Finally, compared with 2016, there are more countries with both significant FTTP and VDSL coverage.

Figure 8: FTTP versus VDSL coverage 2019



Source: BoR (16) 171 (updated based on data from the EU Study on Broadband Coverage in Europe 2019)[10].

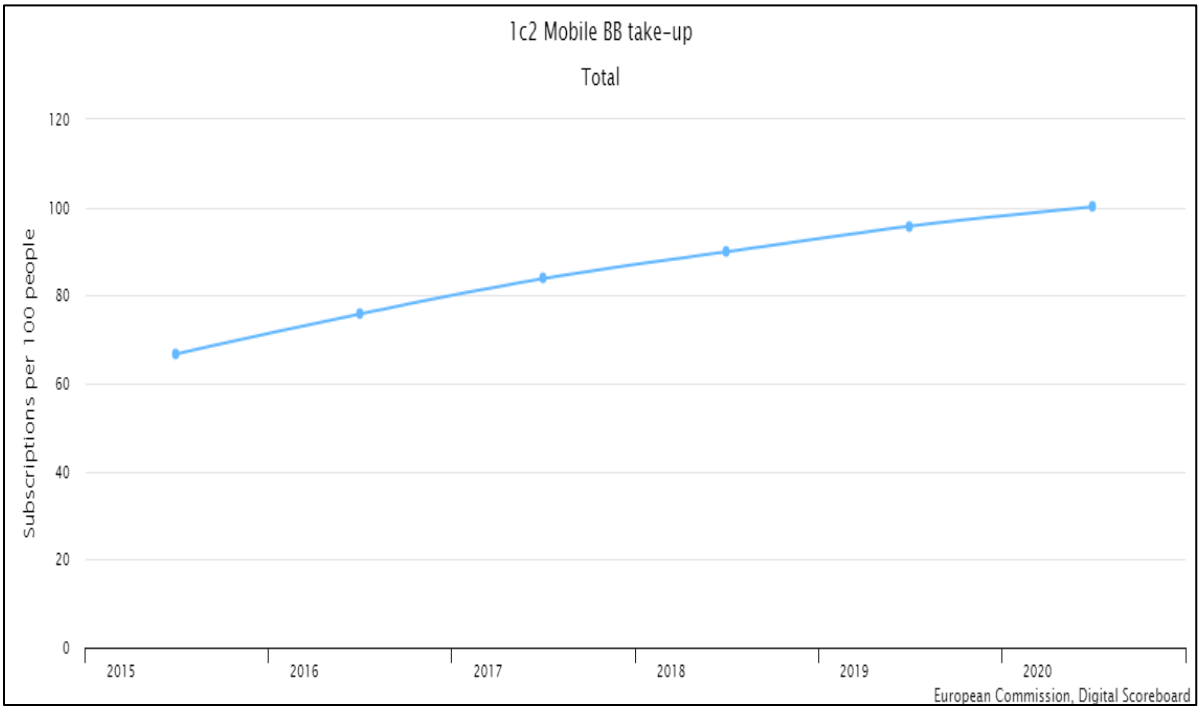
[8] An exception here is Sweden, where the high FTTP coverage is mainly driven by demand-side factors.
[9] In the UK there is VULA regulation and since 2019 also duct (SMP) regulation.
[10] https://op.europa.eu/en/publication-detail/-/publication/077cc151-f0b3-11ea-991b-01aa75ed71a1

3.4 Mobile broadband

Mobile broadband penetration

According to the European Commission's Digital Economy and Society Index, there was a slight increase in the number of subscriptions per 100 people in 2020. The mobile broadband penetration, measured in terms of all active users, was 100.2 per 100 people.

Figure 9: Mobile broadband penetration at EU level



Source: European Commission.

Mobile broadband coverage and mobile data traffic

In retrospect, 2020 will probably also be known as the year in which the role of the telecommunications sector in keeping people and businesses connected was critical. Anecdotal evidence suggests that some countries saw an increase in mobile broadband data traffic in 2020, while others experienced a decline, supported by Wi-Fi offload in homes with good fixed broadband connections. Traffic pattern changes may be explained by COVID-19-related restrictions.

Nevertheless, mobile broadband represents a fast-growing segment of the broadband market. The European Commission Digital Scorecard also shows that in Poland, the Nordic countries, Estonia, Latvia and Luxembourg there are already more than 120 subscriptions per 100 people, while in Hungary the take-up rate is the lowest, with 70 subscriptions per 100 people. Most mobile broadband subscriptions are used on smartphones rather than on tablets or notebooks.

3.5 Termination rates

Termination rates at European level

BEREC constantly monitors domestic[11] termination rates (TRs) in Europe and provides an overview report twice a year on fixed termination rates (FTRs) and mobile termination rates (MTRs). Following interventions by national regulatory authorities (NRAs) in the two relevant markets, namely Market 1/2014, 'Wholesale call termination on individual public telephone networks provided at a fixed location', and Market 2/2014, 'Wholesale voice call termination on individual mobile networks', and the application of the Commission Recommendation on TRs (Recommendation 009/396/EC), the wholesale rates for both mobile and fixed interconnection have fallen significantly and continue to decrease.

In most EU countries, short message services (SMS) are not subject to a wholesale termination price regulation. Nevertheless, a substantial decrease in SMS termination rates has been observed in EU markets over the years.

Mobile termination rates (MTRs)

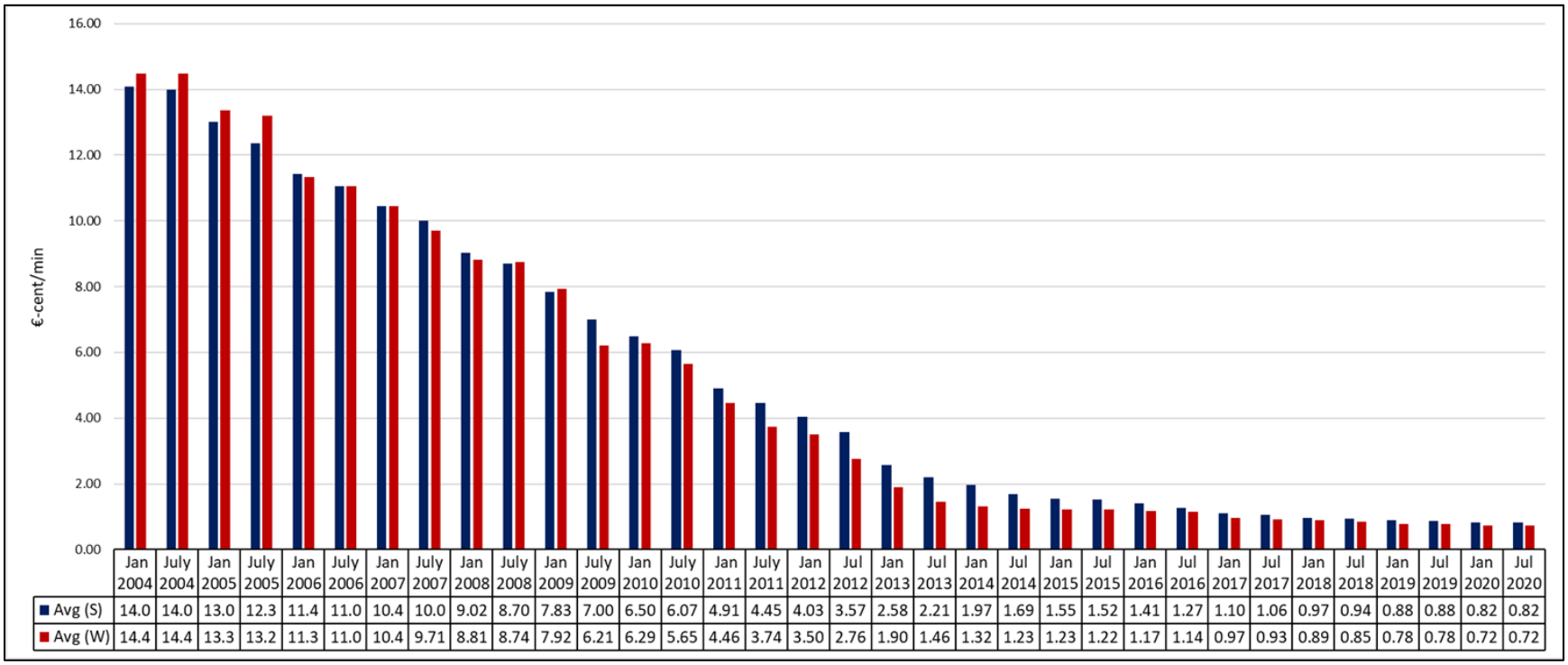
MTRs have been regulated based on cost-oriented pricing in all EU countries since the beginning of the decade. Most NRAs have implemented the Commission Recommendation on TRs (Commission Recommendation of 7 May 2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU (2009/396/EC)), which established pure long-run incremental costs (LRIC) as the cost standard to be applied to the interconnection service for voice calls on mobile networks at wholesale level.

As shown in Figure 10 below, wholesale interconnection rates for mobile telephony services in Europe fell markedly between January 2004 and July 2020: the simple average, Avg (S), fell from 14.08 to 0.82 cents per minute, while the weighted average, Avg (W), fell from 14.47 to 0.72 cents per minute[12].

[11] Referring to calls originating and terminating in the same EU country.

[12] In the BEREC periodic MTR benchmark reports, both simple averages and weighted averages are reported. The latter is calculated by weighting each country's average according to the proportion of the country's subscribers to all subscribers.

Figure 10: Average MTRs: time series of simple average and weighted average at European level[13]



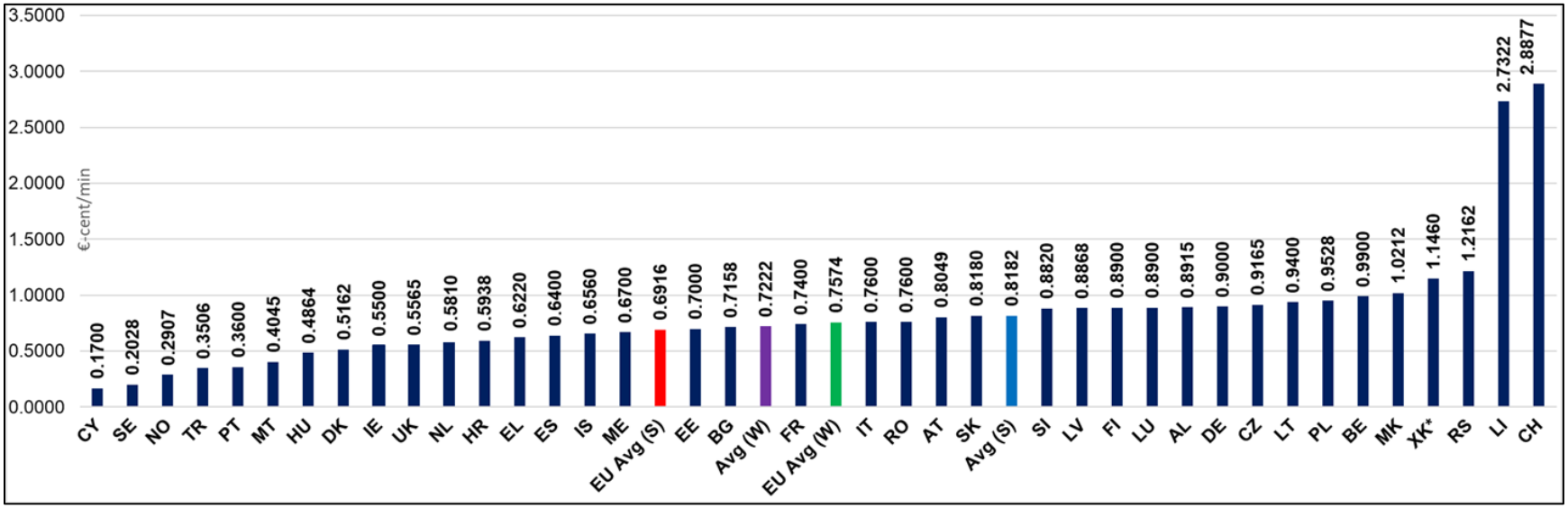
	Jan 2004	July 2004	Jan 2005	July 2005	Jan 2006	July 2006	Jan 2007	July 2007	Jan 2008	July 2008	Jan 2009	July 2009	Jan 2010	July 2010	Jan 2011	July 2011	Jan 2012	Jul 2012	Jan 2013	Jul 2013	Jan 2014	Jul 2014	Jan 2015	Jul 2015	Jan 2016	Jul 2016	Jan 2017	Jul 2017	Jan 2018	Jul 2018	Jan 2019	Jul 2019	Jan 2020	Jul 2020
Avg (S)	14.0	14.0	13.0	12.3	11.4	11.0	10.4	10.0	9.02	8.70	7.83	7.00	6.50	6.07	4.91	4.45	4.03	3.57	2.58	2.21	1.97	1.69	1.55	1.52	1.41	1.27	1.10	1.06	0.97	0.94	0.88	0.88	0.82	0.82
Avg (W)	14.4	14.4	13.3	13.2	11.3	11.0	10.4	9.71	8.81	8.74	7.92	6.21	6.29	5.65	4.46	3.74	3.50	2.76	1.90	1.46	1.32	1.23	1.23	1.22	1.17	1.14	0.97	0.93	0.89	0.85	0.78	0.78	0.72	0.72

Source: BEREC, Termination rates at European level July 2020.

[13] Averages are based on nominal rates per minute of service. The number of countries and operators considered has increased over the years, thus affecting the average slightly. Moreover, the weighted average does not take into account countries not providing the total number of subscribers and those that could have changed over the years. Therefore, the graph shows the general trend.

The simple average of MTRs at EU level (EU Member States only (EU Avg (S))) stands at 0.6916 cents per minute, whereas Avg (W) at EU level is estimated at 0.7574 cents per minute. For July 2020, individual Member States' and observers'[14] average rates[15], together with European and EU simple and weighted averages, are shown in Figure 11.

Figure 11: MTRs by country, July 2020 (eurocents per minute of service)



Source: BEREC, Termination rates at European level, July 2020.

[14] 27 EU Member States plus 4 EFTA states (Switzerland, Iceland, Norway and Liechtenstein) and five economies of the Western Balkans (Albania, Montenegro, North Macedonia, Serbia and Kosovo*). The data for Turkey and the UK is carried over from the previous Termination Rates Report. The United Kingdom withdrew from the European Union on 31 January 2020 with the transition period lasting until 31 December 2020 (the UK officially left the EU on 1 January 2021).
* This designation is without prejudice to positions on status and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo declaration of independence.
[15] Average MTRs per country are obtained by weighting the average MTR of each operator by its market share, measured in terms of subscribers.

Fixed termination rates

From the beginning of the liberalisation period, when incumbent operators served all end-users of fixed network services, the termination service was regulated not only in relation to price but also in relation to service characteristics and quality parameters. The regulation of voice termination in fixed networks resulted in a clear overall decline in FTRs over the past decade, although this is of a smaller magnitude than the decline in MTRs.

However, during the last 2 years, a significant reduction in this regulated price took place in the EU countries, thanks to the increasing implementation of the Commission Recommendation on TRs.

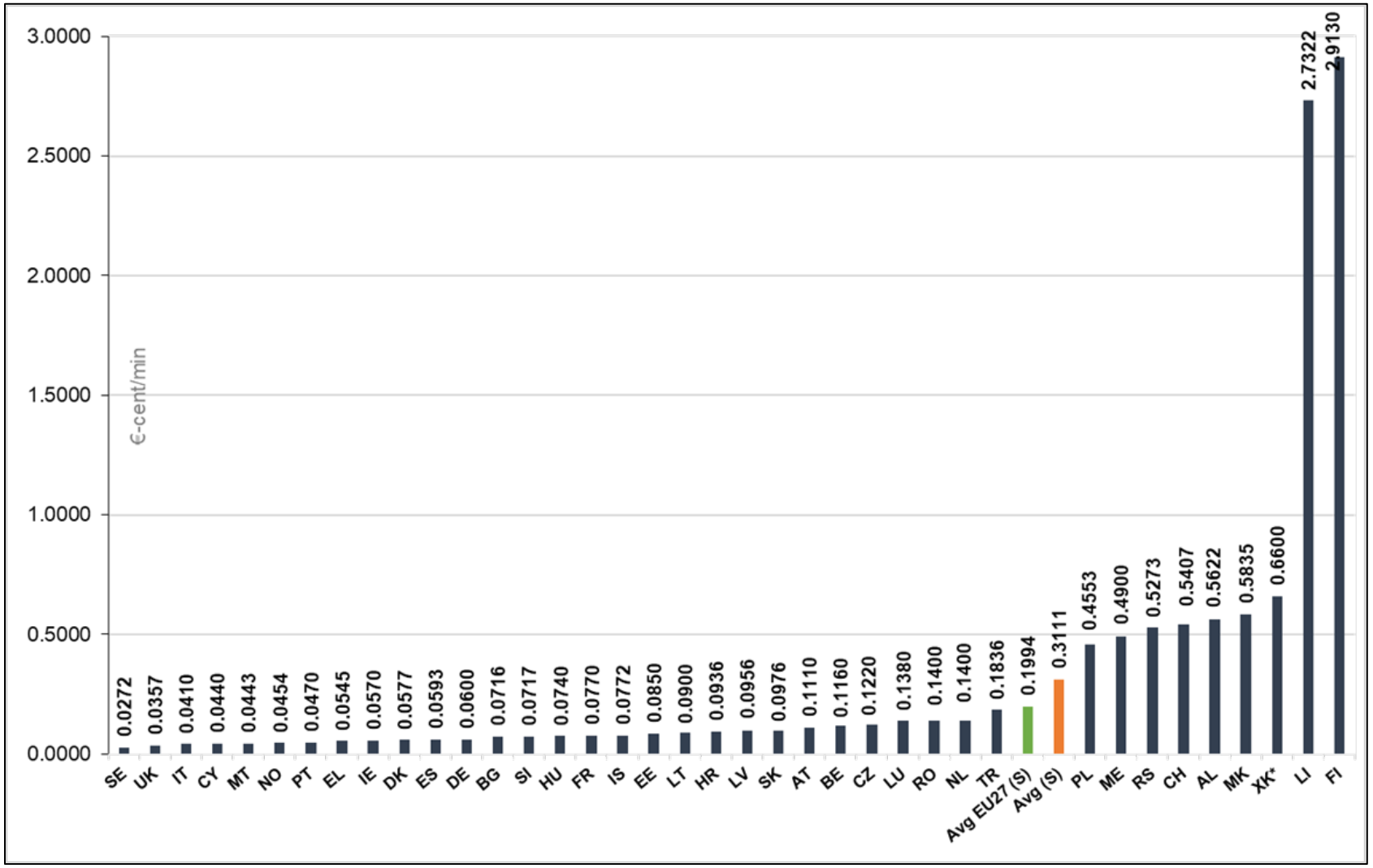
Although the regulation of FTRs had been harmonised by the Recommendation of 7 May 2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU (Recommendation 2009/396/EC), some differences can be found across the national regulatory regimes.

In some cases, the TR is a two-part tariff, composed of a variable part (to be paid for each minute of a call) plus a set-up or fixed part (to be paid for each call). In other cases, termination prices consist only of the variable part.

An overview of incumbents' lowest regulated fixed termination rates per country is provided in Figure 12. Data refer to 1 July 2020 and include simple averages at European level as well as the simple average of EU-27 incumbents. The simple average of the lowest regulated[16] FTR of incumbents at European level (all 37 countries) stood at 0.31 cents per minute. The simple average of the lowest FTR of EU incumbents (EU-27) stood at 0.21 cents per minute.

[16] Interconnection services in fixed networks are provided at different levels in the hierarchy of the incumbents' networks, called layers. Although some peculiarities in specific countries are present, in general three main layers for interconnection are defined: layer 1, or local level service provision (defined as the closest possible interconnection level to the network termination point); layer 2, or regional level service provision (single transit); and layer 3, national level service provision (double transit). As a result of increasing symmetry and the decreasing relevance of the layers, the TR report features a ranking of the lowest regulated rates as well as a weighted average of peak and off-peak rates.

Figure 12: Overview of incumbents' lowest regulated fixed termination rates per country, July 2020 (eurocents per minute of service)



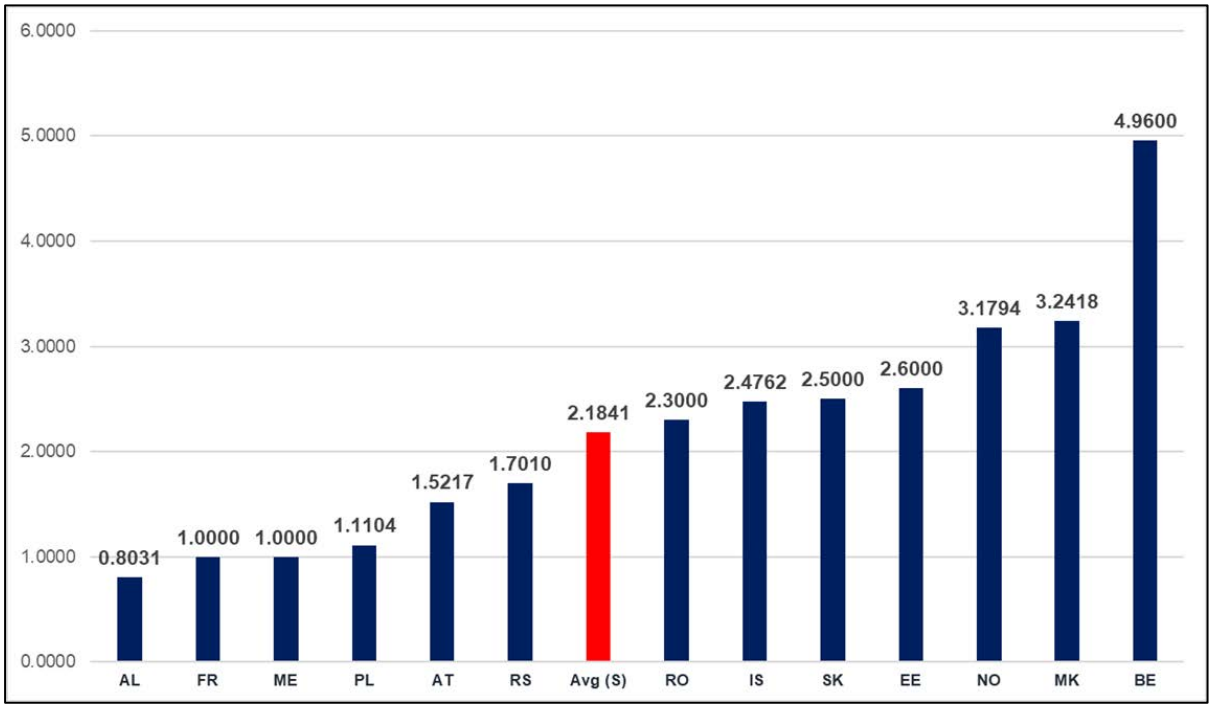
Source: BEREC, Termination rates at European level, July 2020.

Short message service termination rates

A traditionally important service in terms of revenue generated is the messaging (SMS/MMS) service. Just like voice calls, each SMS that originates from one network and is sent to an end-user on another network will need an interconnection, and thus a termination service. In general, off-net wholesale SMS services have not been subject to price regulation in most of the EU-27 Member States (i.e. they were freely set by commercial agreements among operators).

As of 1 July 2020 the simple average of SMS TRs at European level was 2.1841 cents per SMS (Figure 13). Since not all EU Member States report their SMS TRs, BEREC did not calculate any averages at EU level.

Figure 13: SMS TRs by country, July 2020 (eurocents per message)



Source: BEREC, Termination rates at European level, July 2020[17].

3.6 Regulatory accounting

The overall picture of the cost accounting methodologies was 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 caps,

[17] TR (Turkey), MK (North Macedonia), AL (Albania), FR (France), ME (Montenegro), PL (Poland), RS (Serbia), LV (Latvia), SK (Slovakia), AT (Austria), EE (Estonia), IE (Ireland), IS (Iceland), NO (Norway) and BE (Belgium).

but the overall picture is more differentiated), cost base (current cost accounting – CCA) and allocation methodologies (mainly long-run incremental costs (LRIC/LR(A)IC), with fully distributed costs (FDC) preferred only for a 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 Report on Regulatory Accounting in Practice 2020 provides an analysis more oriented towards single products (increasing the scope of monitoring) with respect to the previous editions. In fact, the 2020 report collects information for 21 main products (13 in 2015). As a stable result during the past few years, cost orientation remains the most commonly used price control method and is applied mainly for legacy products, while the retail minus category refers mainly to virtual unbundled local access (VULA) and market 3b products. Economic Replicability Test (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 used as a substitute with respect to cost orientation, in line with the Commission NDCM Recommendation (2013/466/EU).

With regard to the cost base, current cost accounting (CCA) is by far the most commonly used methodology for all markets. The most frequent cost allocation approach is LRIC/LR(A)IC, for almost all products/markets. LRIC is the preferred approach, in particular in termination 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. Fully distributed costs (FDC) is the preferred approach for duct access products in market 4 and WLR. In market 3b for legacy products both methods are used.

For copper local loop unbundling (LLU), most NRAs apply a cost orientation alone/LRIC-LR(A)IC/CCA approach – more than in last year's survey. The specific combination cost orientation and BU-LR(A)IC+ model in market 3a is the main methodology applied in more competitive markets (Fig. 26).

For Next Generation Access Network (NGA) services, where competition and demand conditions are more favourable (low significant market power (SMP) market share in combination with higher NGA services penetration), NRAs are starting to replace strict cost orientation and apply ERT as price control (if any). The application of equivalence of inputs (EOI) is also more frequent in those cases. In particular, when Fibre to the Cabinet (FTTC) is a relevant access product, NGA price flexibility is becoming less frequent in general, and FTTC, through VULA solutions, is becoming the main focus of the regulation (as a sort of 'anchor product' for the transition towards VHCNs/FTTH). In those cases, the VULA-FTTC product is generally treated as Unbundled Local Loop (ULL) services, with the same price control and costing methodology approach, i.e. cost-orientation and an LR(A)IC+ approach for the bottom-up model (BU-LR(A)IC+). All this confirms that NRAs are following the 2013 Recommendation on non-discrimination obligations and costing methodologies, and thereby converging further.

Accounting separation is often imposed together with the cost accounting obligation. Some NRAs consider that it is necessary to impose both obligations in order to ensure that robust regulatory accounting information is available for each product. In particular, in a quite mature and stable environment, such as LLU services in market 3a, 22 NRAs reported that they

applied accounting separation (as at last year). A particular case is represented by the termination markets where NRAs that have established prices through pure BU-LRIC models have, in some cases, removed the Accounting Separation obligation at the same time; only 15 NRAs still maintain the obligation for the mobile termination market whereas 31 NRAs apply a price control obligation.

In termination markets, in line with Commission Recommendation 2009/396/EC, a bottom-up approach is more frequent, irrespective of the type of price control in use. The analysis of the structural data (Chapter 4) confirms that countries are very different 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 2020 (BoR (20) 116), this BEREC Regulatory Accounting Report WACC chapter 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 Weighted Average Cost of Capital (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)[18] and thus similar parameters for determining the WACC. However, the value of these parameters naturally differs according to the different national financial market conditions. Data shows – in line with the previous exercises – that the differences in the final WACC values over time are mainly explained by parameters in the WACC calculation that are more 'country-specific' such as the risk-free rate (RFR), equity risk premium (ERP) and tax rate, with a less relevant role for parameters such as beta, gearing and debt premium. An analysis was made with regard to the different years, and NRAs took the WACC decision to show the impact of the time variable when taking a WACC decision. This year's report also summarises separately WACC information, taking into account only EU countries that are subject to the Article 7 procedure.

Overall, the 2020 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 is more pronounced for the termination markets, whereas we see a more differentiated picture for the wholesale access markets reflecting the different national market situations and structural factors influencing the regulatory strategy.

For the third time, the report also provides information about the regulatory and competitive framework in each Member State, such as the presence of a geographical regulation, the equivalence model applied, the application of a retail margin squeeze test, the vectoring regulation, the cable regulation and the issue of wholesale-only operators. A brief analysis of symmetric remedies is included. Outcomes of the survey are simply reported in a descriptive manner.

[18] Cf. BoR (13) 110.

3.7 5G

5G is one of BEREC's strategic priorities. The challenges that are addressed range from work on standards, interoperability, new business models, spectrum availability and network sharing, coverage, Quality of Service (QoS), security and resilience.

The fixed and wireless networks are essential infrastructure in Europe, even more so in times of crisis. Therefore, the misinformation about electromagnetic fields (EMFs) and 5G may act as a barrier to the timely rollout of 5G networks. To address these challenges, a joint BEREC and Radio Spectrum Policy Group (RSPG) statement was drawn up during the year in which both parties strongly support measures to protect the public and workers from any harmful effects arising from exposure to EMFs.

BEREC is committed to effective regulation of the electronic communications sector to promote competitive markets and technological innovation, reduce the digital divide, contribute to a harmonised regulatory environment in Europe and promote the Digital Single Market for the benefit of European citizens.

In January 2020, the Network and Information Systems Cooperation Group (NIS CG) published the 'Cybersecurity of 5G networks – EU Toolbox of risk mitigating measures'[19] ('5G Toolbox'), which identifies a common set of measures.

BEREC contributes towards the effective implementation of the Cybersecurity EU Toolbox to ensure a comprehensive regulatory approach to the electronic communications markets in line with market dynamics.

In order to assess the progress of the implementation of the 5G Toolbox among Member States, BEREC set a task for its Ad hoc Working Group on 5G Cybersecurity that was coordinated with the NIS CG and the European Commission for BEREC to contribute to the implementation aspects of SM05 and SM06 of the 5G Toolbox with the fact-finding survey that would gather information about the SM05 and SM06 perception by NRAs and Mobile Network Operators (MNOs) and the present and future implementation possibilities.

3.8 Forward-looking trends in the electronic communications sector

Fixed and mobile internet access growth has persisted year-on-year as usage has transitioned from voice connectivity to data connectivity, in particular video. Software and hardware development have led to an upsurge in a number of services that rely on video such as video conferencing, social media interactions, video streaming on demand and gaming. The continuous technological development of new smartphones and connected flat-panel television sets play a role in the demand for more video. Cisco predicts that by the year 2023, 66% of connected flat-panel television sets will be ultra-high definition (UHD)[20], while the total number of connected televisions will amount to 3.2 billion by the same year. Smartphone connectivity will increase at an even faster rate.

---

[19] Cybersecurity of 5G networks – EU Toolbox of risk mitigating measures, 31 January 2020.
[20] Cisco Annual internet Report (2018-2023), updated March 2020.
Source: https://www.cisco.com/c/en/us/solutions/collateral/executive-perspectives/annual-internet-report/white-paper-c11-741490.pdf

The mobility restrictions imposed to reduce the spread of COVID-19 during 2020 intensified society's needs for connectivity. Society and businesses immediately reacted to the restricted movement and socialisation by adopting new digital services. Remote working became the modus operandi of a significant part of our workforce. Online lectures and digital classrooms supported the continuity of the education sector. These drove an increase in the usage of video-calling applications such as Zoom and Microsoft Teams[21]. E-commerce was also boosted as both consumers and businesses shifted to online shopping.

While policy-makers have been encouraging digitalisation for a number of years, the COVID-19 restriction provided the impetus for the digital services to take centre stage and demonstrate the socioeconomic benefits that they can deliver. In 2016, the European Commission had defined its vision of a European Gigabit Society[22] by defining a number of goals that are necessary to ensure that the entire European Union can reap the full economic and social benefits of the digital transformation. In its communication, the European Commission recognised the role that the electronic communications sector, in particular Very High Capacity Networks (VHCNs) play, by declaring a number of goals that must be attained by the year 2025. These include:

- gigabit connectivity for all main socioeconomic drivers[23];
- all urban areas and all major terrestrial transport paths will have uninterrupted 5G coverage;
- all European households, rural and urban, will have access to internet connectivity offering a downlink of at least 100Mbps upgradable to gigabit speed.

The above-mentioned accelerated uptake of digital services, coupled with in-home entertainment, has intensified network usage, primarily over fibre but also mobile networks[24] confirming the European Commission's recommendation for increasing the coverage and uptake of VHCNs. The increased network surge during 2020 led to a number of trends in the infrastructure deployment of the electronic communications network, including the upward trend of fixed mobile convergence[25]. This also resulted in an increase in the amount of Fixed Wireless Access (FWA) offerings, especially as FWA can in some cases be the quickest way to deploy fast and reliable home broadband connectivity[26].

Studies forecast that the digital transformation sparked by the COVID-19 pandemic may be here to stay[27]. Therefore, fixed and mobile broadband networks must sustain the resulting

---

[21] 'COVID-19 has changed online shopping forever, survey shows', UNCTAD, October 2020, Source: https://unctad.org/news/covid-19-has-changed-online-shopping-forever-survey-shows
[22] COM(2016) 587 final.
[23] Schools, transport hubs, main providers of public services, digitally intensive enterprises.
[24] 'Global Mobile Trends 2021 - Navigating Covid-19 and beyond', GSMA Intelligence, December 2020. Source: https://data.gsmaintelligence.com/api-web/v2/research-file-download?id=58621970&file=141220-Global-Mobile-Trends.pdf
[25] 'The post-pandemic landscape: the impact of COVID-19 and opportunities for telecoms operators', Analysys Mason, December 2020.
[26] Ericsson Mobility Report, November 2020, Source: https://www.ericsson.com/4adc87/assets/local/mobility-report/documents/2020/november-2020-ericsson-mobility-report.pdf
[27] 'COVID-19 has changed online shopping forever, survey shows', UNCTAD, October 2020 Source: https://unctad.org/news/covid-19-has-changed-online-shopping-forever-survey-shows

network usage even when the pandemic is over. As a result of the new digital services that are driving new societal and economical needs, we can expect a continuation of the phasing out of legacy networks. Moreover, the European Commission[28] is calling on Member States to help speed up the rollout of fibre and next generation wireless networks to support emerging and future digital processes and applications. Therefore, an upgrading of existing networks, both fixed and cellular, is to be expected, as well as a concentrated effort by the public and private sectors to deploy VHCNs in rural areas.

The European Commission, Member States and the private sector have also worked together to carry out trials and implement pilot projects relating to 5G. 5G is the new generation of cellular connectivity that has been advertised as the panacea of our connectivity needs by catering for three cases of use:

- Enhanced Mobile Broadband (eMBB);
- Ultra-Reliable Low Latency Connectivity (URLLC);
- Massive Machine Type Communication (mMTC).

In doing so, 5G is expected to deliver results that match those of fibre-like connectivity i.e. ubiquitous gigabit speeds, improved performance and reliability. This requires a number of technological developments including massive multiple-input and multiple-output (MIMO) methods, beamforming enhancements, spectrum sharing, Software-Defined Networking, Network Function Virtualisation, augmented power consumption, Mobile Edge Computing, network slicing and network densification. For certain use cases, private 5G networks may be considered. These new developments mean new opportunities not just for the Mobile Network Operators but also for other stakeholders.

5G has been deployed commercially in a large number of Member States but it should be noted that 5G coverage is still localised, with only 24% of the European population within 5G coverage by September 2021[29]. Monetisation of 5G investments for operators is still unclear. Both the 5G ecosystem and business models are still developing. These also depend on the role the vertical markets will play in delivering high-value, data-centric products or services for distribution over the 5G network. Despite these challenges, penetration of the 5G network is expected to increase during 2021, reaching 6.9% of the population[30].

Another trend that is expected to be sustained is the increase in machine-to-machine (M2M) communication. This will also be driven with further development in the 5G use cases, namely mMTC. The use of M2M devices is predicted to grow at the fastest rate out of all the mix of devices, meaning that M2M connections will account for half of the total devices and connections by 2023, followed by smart phones[31]. The massive increase in the demand for devices could also lead to an increasing and potentially massive demand in E.164 numbers and other types of numbering resources (e.g. E.212).

---

[28] C(2020) 6270 final.
[29] 'The State of Digital Communication', ETNO, January 2021.
[30] 'The State of Digital Communication', ETNO, January 2021.
[31] 'Cisco Annual internet Report (2018-2023) https://www.cisco.com/c/en/us/solutions/collateral/executive-perspectives/annual-internet-report/white-paper-c11-741490.pdf updated March 2020.

Demand for very high capacity and ubiquitous connectivity are not the only elements driving new trends. A key driver for the transformation of the digital economy lies at the intersection of enhanced connectivity, with emerging technologies enabling automation, namely Artificial Intelligence (AI) and the internet of Things. Intelligent connectivity is the combination of hyper connectivity – connecting anything, anywhere, anytime, over ultra-high speed and low latency connectivity with the advanced automation technologies. AI, Big Data and Augmented Reality will stimulate the development of smarter, more complex digital services such as Digital Twins and Cyber-Physical Systems, which use sensors, actuators, network connectivity and AI to model physical elements for solving complex solutions. AI will also play a key role in the core of mobile networks, seeking to make cellular networks more responsive and energy efficient.

Another emerging trend is the role of satellite connectivity in supporting EU priorities. In addition to the use of satellite technology such as the European GNSS Programme and Copernicus for addressing environmental challenges, satellite connectivity can provide connectivity to remote areas. 3GPP Release 17 will include specifications for the inclusion of non-terrestrial access, i.e. satellites and High-Altitude Platforms (HAPs) in 5G new radio[32].

Finally, the environmental issue is at the heart of concerns, and the electronic communications sector is no exception. In fact, the European Commission recently placed the promotion of sustainability within the digital sector in the context of the Green Deal. The Commission notes that (p. 9):

'At the same time, Europe needs a digital sector that puts sustainability at its heart. ***The Commission will also consider measures to improve the energy efficiency and circular economy performance of the sector itself, from broadband networks to data centres and ICT devices*** *(emphasis added). The Commission will assess the need for more transparency on the environmental impact of electronic communication services, more stringent measures when deploying new networks and the benefits of supporting 'take-back' schemes to incentivise people to return their unwanted devices such as mobile phones, tablets and chargers.'* [33]

In addition, the Commission's recent **digital strategy** states (p. 13): *'Yet it is also clear that the ICT sector also needs to undergo its own green transformation. The environmental footprint of the sector is significant, estimated at 5-9% of the world's total electricity use and more than 2% of all emissions. Data centres and telecommunications will need to become more energy efficient, reuse waste energy, and use more renewable energy sources. They can and should become climate neutral by 2030.*

How ICT equipment is designed, bought, consumed and recycled also matters. Beyond the energy efficiency requirements of Ecodesign, ICT equipment must become fully circular – designed to last longer, to be properly maintained, to contain recycled material and to be easily dismantled and recycled.' [34]

---

[32] https://www.3gpp.org/release-17

[33] Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, The European Green Deal, 11.12.2019 COM (2019) 640 final.

[34] Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, Shaping Europe's digital future, 19.2.2020 COM (2020) 67 final.

Therefore, environmental issues will be another important dimension of the concerns of the sector.

4. Regulatory framework

The launch of the national processes for the transposition of Directive 2018/1972 establishing the European Electronic Communications Code (EECC) suffered a delay in most Member States, mainly due to the exceptional situation caused by the outbreak of the COVID-19 pandemic. Expected by 21 December 2020, the transposition is still lagging behind and, on 4 February 2021, the European Commission sent letters of formal notice to 24 Member States, asking them to adopt and notify their national transposition measures.

During the 2 years following the adoption of the Code, BEREC has been intensively working on the transposition process, through the formulation of a considerable number of guidelines on the harmonised and effective application of the Code to ensure consistent and predictable application of the rules throughout the digital single market.

BEREC also carried on the project of establishing several databases, in line with the EECC provisions (Article 12(4), on General Authorisation; Article 109(8), on E.164 emergency services; and Article 93(4), on the numbering resources with a right of extraterritorial use within the Union).

BEREC provided contributions and opinions on several proposals to review the existing legislation: the Access Recommendation, the Delegated Act on fixed and mobile termination rates; the Digital Services Act and the New Competition Tool; and the Relevant Market Recommendation. BEREC focused accordingly on ensuring a platform for its member NRAs to exchange views on any national transposition issue arising, involving the Commission, where necessary.

5. Openness of the internet

In 2020, BEREC finalised the update of the Net Neutrality Guidelines, already launched in 2019. The updated Guidelines were renamed the BEREC Guidelines on the Implementation of the Open internet Regulation and published together with the corresponding consultation report. Additionally, an implementation report was published as in previous years, with the inclusion of a section on the COVID-19 pandemic. With regard to the outbreak of this pandemic, BEREC committed to a special reporting mechanism to ensure regular monitoring of the internet traffic situation in each Member State in order to be able to respond swiftly to capacity issues. The regular reporting showed that networks across Europe managed well and coped effectively with the additional data traffic during the pandemic.

Furthermore, BEREC continues (through 2020 and into 2021) to collect information on other measures implemented by the National Regulatory Authorities (NRAs) as well as on other initiatives by public and private parties throughout Europe and releases summary reports on a regular basis.

Another of BEREC's strategic goals for 2020 was to foster a consistent approach of open internet principles. In this respect, BEREC provided a forum to support NRAs in applying the Open internet Regulation consistently in Europe by discussing national cases and questions. Furthermore, BEREC continued its work looking into how the open internet rules are affected by changes in markets and new technologies.

6. 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. 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, enabling consumers to use their mobile phones anywhere in the EU, just like in their home country, without any additional surcharge ('Roam Like at Home' – RLAH). Only in exceptional cases may the operator levy a surcharge for EU roaming.

To assess the competitive developments and the impact of RLAH on the EU-wide roaming markets, BEREC regularly collects data from NRAs on the development of retail and wholesale charges for regulated voice, SMS and data roaming services. It also includes wholesale charges applied for 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 of contractual measures at wholesale level that aim to prevent permanent roaming or anomalous or abusive usage of wholesale roaming access for purposes other than roaming.

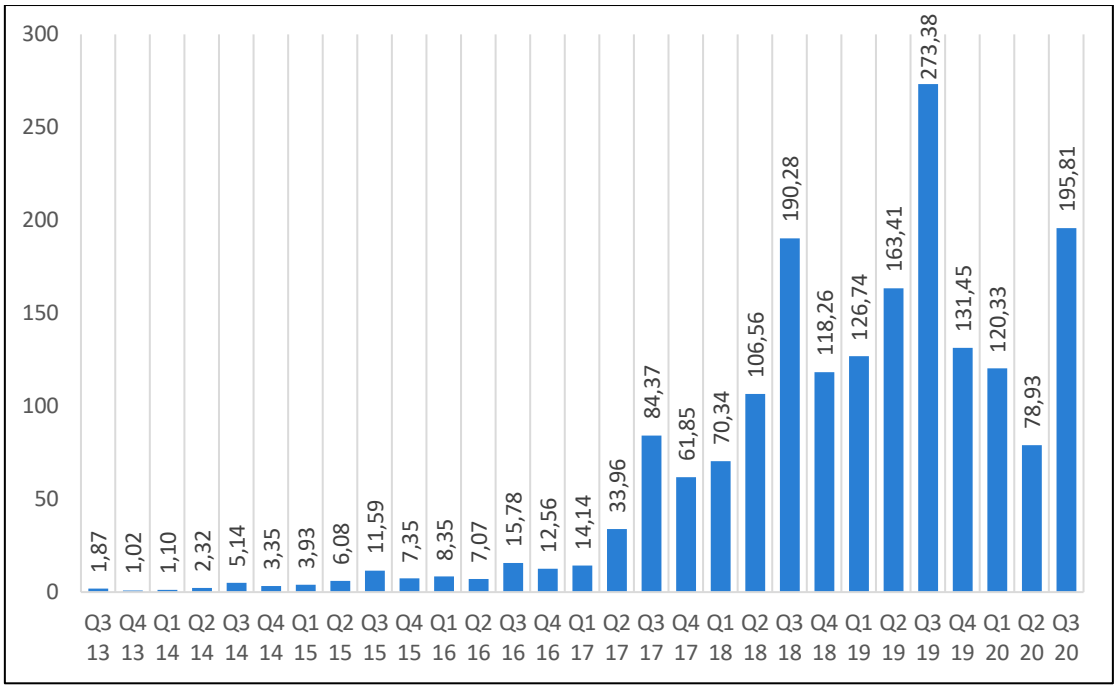
On the basis of the data collected, BEREC reports regularly on the evolution of pricing and consumption patterns in the Member States for both domestic and roaming services, the evolution of actual wholesale roaming rates for unbalanced traffic between roaming providers, and the relationship between retail prices, wholesale charges and wholesale costs for roaming services. BEREC assesses how closely these elements interrelate.

The introduction of RLAH services, coupled with the growing demand for data services, has changed the international roaming market. A relevant point is that RLAH services have enabled a substantial increase in international roaming traffic. However, due to the travel restrictions imposed due to the COVID-19 pandemic, 2020 was the first year in which the data collected in the context of the Roaming Regulation showed a decrease.

Although the total roaming volume for data services has been constantly increasing, also taking seasonality into account, this was not the case for the second and third quarters of 2020. In particular, the total EEA roaming traffic in Q2 2020 was 78.93 million gigabytes (GBs) while the same figure for Q2 2019 was 163.41 million GBs. For Q3 2020 there were 195.81 million GBs, compared with 273.38 million GBs for Q3 2019 (see Figure 14 below). This reduction is also noticeable for roaming voice services.

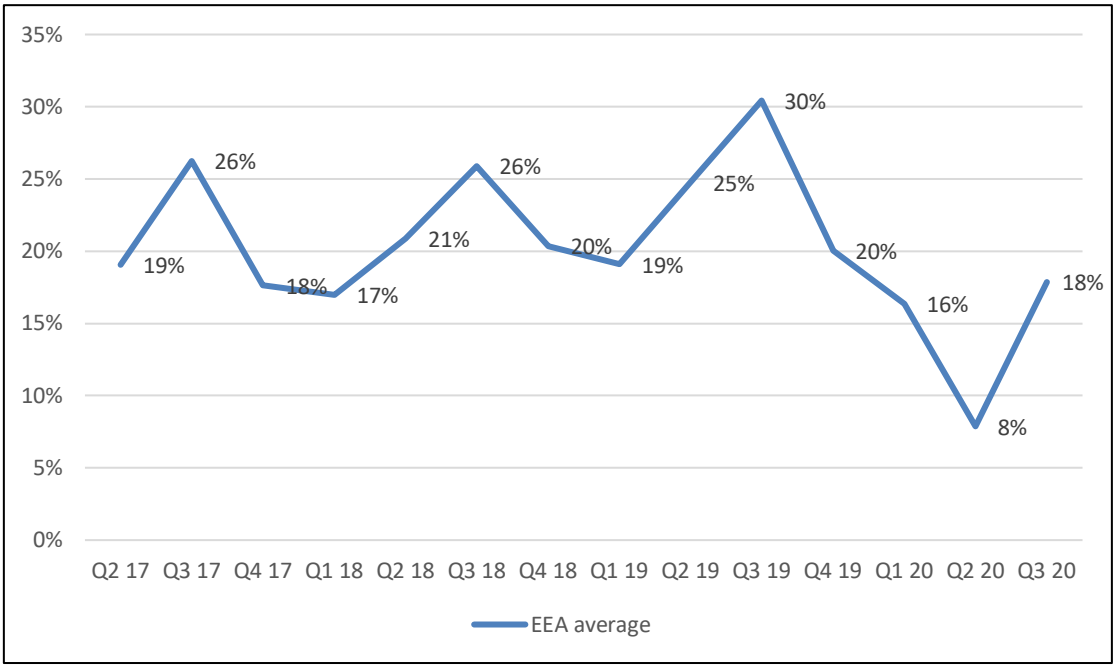
In addition, according to the data collected, the percentage of roaming-enabled subscribers actually using roaming services fell sharply in 2020, with a value of 8% in Q2 2020 (as against 25% in Q2 2019) and a value of 18% in Q3 2020 (as against 30% in Q3 2019) (see Figure 15).

Figure 14: EEA retail data traffic, Q3 2013 - Q3 2020 (in GB million)



Source: BEREC, International Roaming BEREC Benchmark Data Report April 2020 - September 2020

Figure 15: Percentages of subscribers that were roaming at least once in the EEA in the relevant quarter, compared to the total number of subscribers with roaming-enabled subscriptions, Q2 2017 - Q3 2020



Source: BEREC, International Roaming BEREC Benchmark Data Report April 2020-September 2020

BEREC analysed domestic retail prices and found it hard to disaggregate the different mobile communication services, since they are often provided as part of a bundle of several services. This includes intra-EEA roaming communications and, in several cases, also non-mobile services. Operators are finding it difficult to organise their revenue data by individual service categories, such as fixed telephony, mobile telephony, fixed broadband or intra-EEA roaming communications, and no common methodology has been defined for this purpose. Bundles challenge this practice, as individual service categories require bundle revenue to be allocated to their components.

Given this, BEREC examined the alternative of presenting data on the evolution of the average retail revenue per user (ARRPU). Any further conclusions on the price levels of mobile communication services can be made only through a thorough review of retail prices. In spite of the limitations and lack of a common methodology, as mentioned above, BEREC has calculated the ARRPU; however, the results should be interpreted with caution. For this calculation, BEREC used data relating to domestic mobile services submitted by operators. The domestic monthly ARRPU for Q3 2020 varies considerably between countries, ranging from EUR 3.61 per month to EUR 29.53 per month, with a weighted EEA average of EUR 9.96. The differences between individual ARRPUs could be caused by the different methodologies used by operators to allocate the revenue relating to different domestic mobile services.

At the wholesale level, the voice, SMS and data roaming charges set between operators have fallen significantly below the regulated average caps. However, in most cases, the EEA

average prices in Q2 2020 and Q3 2020 were higher than those of 2019, and this is most probably because of the significantly lower volumes as a result of COVID-19 restrictions. The applicable price caps and the related EEA average prices during the data collection period were as follows:

Service at wholesale level (no VAT)	Q2 2020		Q3 2020	
	Price cap	EEA average	Price cap	EEA average
Wholesale voice (€c/minute)	3.2	2.10	3.2	2.17
Wholesale SMS (€c/SMS)	1	0.41	1	0.37
Wholesale data (€/GB[35])	3.5	1.74	3.5	1.60

7. Conclusions

BEREC's work in 2020 was inevitably impacted by the COVID-19 pandemic. However, the information set out above and the details set out in Part B of these Annual Reports 2020 shows that, despite the difficulties presented, BEREC was able to work effectively in a virtual environment and meet the targets (i.e. the workstream deliverables) set in the BEREC Work Programme 2020.

One of those workstream deliverables was the BEREC Strategy 2021-2025, which sets out BEREC's strategic objectives over the next 5 years, an extended period (compared to previous BEREC strategy documents) which enables better alignment with the legislative cycle of the European Commission and the objectives and new priorities set out by President von der Leyen for the period 2019-2024. At the same time, the structure of the BEREC strategy reflects the three high-level strategic priorities of BEREC.

Over that 5-year period we expect, of course, to see challenges and opportunities in the sector, yet at the same time some trends will move ahead in a stable fashion as they have in recent years. It can be expected that the work and outputs of BEREC over the last 2 years in particular, with respect to the guidelines ensuing from the European Electronic Communications Code (EECC), will begin to see fruit and contribute to the development and growth of the electronic communications sector as well as benefiting the citizens of Europe.

In 2020, BEREC continued to strengthen its international engagement and built on its close relationships with regional regulator groups, as well as further develop its connections with global organisations in the field of electronic communications regulation. In late January 2020, the BEREC Chair and Vice-Chairs travelled to the West Coast of the United States to meet senior policy-makers, technical and project leaders from global industry stakeholders and academics leading research into self-programming networks. The West Coast of the United

[35] Conversion of gigabyte to megabyte was done in line with recital 17 of Regulation (EU) 2017/920 of the European Parliament and of the Council of 17 May 2017 amending Regulation (EU) No 531/2012, which results in 1 gigabyte being equal to 1,000 megabytes.

States has for many decades been a centre of innovation, and companies based there are often world leaders in their field. For this reason, it was decided that this would be an opportunity to explore topics that would previously have been considered adjacent to the telecommunications sector and, therefore, outside BEREC's remit, but which in a converging world are becoming more relevant.

Finally, in 2020, BEREC proposed addressing the sustainability issues relating to the technical operations of BEREC / the BEREC Office and created an expert networking group (ENG) to propose changes to BEREC's working procedures. In accordance with the BEREC Strategy 2021-2025 and in the context of the Green Deal, BEREC considered that the ENG should assess the wider remit of the work carried out by BEREC and the NRAs in the digital sector, in particular regarding the environmental impact of electronic communications networks. To bring BEREC in line with the European Commission's expectations on the sustainability of the electronic communication network and services, and to assess whether or not there is scope within the regulatory actions of NRAs to positively impact or minimise the negative impact of the sector on the environment, the ENG focused on developing the knowledge of the NRA experts and BEREC about the environmental impact of the digital sector.

PART B: Annual Report on BEREC activities in 2020

Annual Report on BEREC activities in 2019, in accordance with Article 22 of Regulation (EU) No 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

In this annual report, the activities of the Body of European Regulators for Electronic Communications (BEREC) in 2020 are presented in accordance with Article 22 of Regulation (EU) No 2018/1971 establishing the Body of European Regulators for Electronic Communications (BEREC) and the BEREC Office.

The report focuses on the work streams and priorities stated in the BEREC Work Programme 2020 and updated throughout the year, and mainly carried out by BEREC's Working Groups and ad hoc working groups. The final documents (among them BEREC Guidelines, Opinions, Reports and others) were published after approval by BEREC's Board of Regulators.

In 2020 BEREC reviewed its current strategy that expired in 2020 to align its objectives and strategic priorities with the new regulatory framework and to ensure that it remained relevant in relation to recent market developments and technological trends. The 3-year period of its application was extended to 5 years, and the BEREC Strategy 2021-2025 would thereby provide better alignment with the legislative cycle of the European Commission. The structure of the new strategy was chosen with a view to following high-level strategic priorities, defined as: promoting full connectivity, supporting sustainable and open digital markets and empowering end-users.

Due to the outbreak of the COVID-19 pandemic, the European Commission, in accordance with Article 40(2) of the BEREC Regulation, requested BEREC to deliver regular monitoring of the situation and report any significant unexpected event of the internet traffic situation in each Member State linked to the pandemic. BEREC decided to set up information-gathering exercises relating to the measures implemented to mitigate any adverse consequences of the pandemic in Europe. The Open Internet (OI) BEREC Working Group coordinated the special monitoring mechanism that was established to ensure regular monitoring of the internet traffic situation in each Member State, so as to respond swiftly to any capacity issues. The exercises focused on network capacity and other COVID-19-related measures, such as consumer protection, spectrum and security issues.

One of BEREC's priorities for 2020 was 5G and Very High Capacity Networks (VHCN), and several working groups were devoted to this priority. In this regard the core activity of BEREC in 2020 was to finalise and publish the various Guidelines foreseen to be delivered by BEREC according to the Code, namely the BEREC Guidelines on very high capacity networks according to Article 82 (EECC) and the BEREC Guidelines on the consistent application of the conditions and criteria for assessing co-investments in new very high capacity network elements according to Article 76 (EECC), as well as the Article 22 (EECC) Guidelines for geographical surveys of network deployments. Furthermore, BEREC

published the Guidelines on symmetric regulation according to Article 61.3 (EECC), as well as the Guidelines on the identification of the network termination point according to Article 61.7 (EECC). Finally, BEREC published Guidelines on the quality of service parameters according to Article 104 (EECC).[36]

In accordance with the new European Electronic Communications Code (EECC), BEREC published guidelines on VHCNs to provide guidance for the national regulatory authorities (NRAs) on the criteria that a network must fulfil in order to be considered a very high capacity network. BEREC was also required to publish guidelines to foster the consistent application by NRAs of the criteria for assessing co-investments in new very high capacity network elements. In addition, a report was published in 2020 on the impact of 5G on regulation and the role of regulation in enabling the 5G ecosystem. Furthermore, a radar was developed to identify the most important points for BEREC and the NRAs and to establish when regulators should be prepared for those developments. The BEREC 5G radar was developed as a tool to identify developments in the 5G ecosystem that may need regulatory attention and to prioritise them in time.

International cooperation is a constant priority for BEREC. There were a number of memorandums of understanding (MoUs) that expired in 2020, with the FCC (Federal Communications Commission of the United States of America), EMERG (Euro Mediterranean Regulators Group), TRAI (Telecom Regulatory Authority of India) and the CRTC (Canadian Radio-television and Telecommunications Commission), and these MoUs were therefore extended during the year for an indefinite period. BEREC attended events organised by BEREC partners, and also organised an expert workshop with the OECD on Quality of Service (QoS) and Quality of Experience (QoE) of communication network and services. Furthermore, in 2020 BEREC co-signed a joint statement with the Radio Spectrum Policy Group (RSPG) dedicated to electromagnetic fields (EMFs).

2. Work Programme 2020

2.1. Responding to connectivity challenges and new conditions for access to high capacity networks

2.1.1. Opinion on the review of the European Commission Recommendation on Relevant Markets

In accordance with Article 64 of the European Electronic Communications Code (EECC), the European Commission had to adopt a Recommendation on Relevant Product and Service Markets no later than December 2020. This new recommendation stems from the Recommendation on Relevant Product and Service Markets reviewed in 2014. The Recommendation identifies those product and service markets within the electronic communications sector which may justify the imposition of regulatory obligations set out in this

[36] BEREC Guidelines are available on the document register on the BEREC website at https://www.berec.europa.eu/eng/document_register/subject_matter/berec/regulatory_best_practices/guidelines/

directive, without prejudice to markets that may be defined in specific cases under competition law.

In 2019, the European Commission launched a public consultation on the review of the European Commission Recommendation on Relevant Markets, to which BEREC responded in June 2019 (see BoR (19) 107). During 2020, BEREC provided data and maintained meetings with WIK Consult, which was responsible for preparing the report 'Future electronic communications product and service markets subject to ex-ante regulation', commissioned by the European Commission and used as a basis for preparing the draft recommendation on relevant product and service markets susceptible to ex-ante regulation. In January 2020, BEREC also participated in a workshop organised by the European Commission where consultants presented the intermediary results of the study commissioned by the Commission on the evolutions and potential treatment of specific markets.

The draft recommendation was published by the European Commission in August 2020, and, in accordance with Article 64 of the EECC, the European Commission had to publish the definitive recommendation in December 2020, taking the utmost account of BEREC's opinion, provided in October. The final recommendation was published by the European Commission and entered into force in December 2020.

Document:

BoR (20) 174: BEREC Opinion on the European Commission's Draft Recommendation on relevant product and service markets susceptible to ex-ante regulation

2.1.2. External workshop with the OECD on QoS and QoE of communication networks and services

The external joint OECD/BEREC webinars on improving customer experience of electronic communication services through Quality of Service (QoS) and Quality of Experience (QoE) built on a long-term collaboration between BEREC and the OECD. The idea was to focus on relevant aspects of QoS and QoE in an international virtual environment in order to advance the discussion on the role played by quality aspects in the electronic communications market. The initial idea was to hold a workshop on 23-24 June 2020 in Stockholm; however, due to the COVID-19 crisis, the BEREC Board of Regulators decided to hold two webinars instead, on 23 and 30 June 2020.

The first webinar offered an introduction to Quality of Service (QoS), its role in communication markets, from both the BEREC and the OECD perspective, and how QoS could contribute to an enhanced connectivity experience with country experiences being shared by the National Information Society Agency (NIA) in Korea and the French National Regulatory Authority (ARCEP). The second webinar focused on QoS and QoE in relation to accessibility, e-health, video communication and how to capture quality of experience through standardisation to improve the quality of online collaboration for all. Presentations were given by representatives from the European Commission, the WDTM and Federal Communications Commission (FCC) from the United States and ITU-T Study Group 12 (telecommunications study group of the International Telecommunication Union). The concluding remark highlighted the fact that

connectivity is a pillar of the digital transformation and that measures to improve broadband performance are essential.

Document:

BoR (20) 158: Summary report on the joint OECD and BEREC Webinars on improving customer experience of electronic communication services through QoS and QoE

2.1.3. Input towards the evaluation and potential review of the EU State Aid Guidelines

The BEREC Work Programme 2021 foresees in the section 'obligatory work' (section 5.1.3) input from BEREC towards the evaluation and potential review of the EU State Aid Guidelines. On 8 September 2020 the European Commission (DG COMP) launched a targeted public consultation on the evaluation of the state aid rules for the deployment of broadband networks, which ended on 5 January 2021. The BEREC response to this public consultation focuses on the questions for which NRAs have specific experience in the application of state aid rules and/or which were possible to answer based on the experience gained in sector regulation, in particular with regard to market analysis, wholesale access products and pricing principles. The BEREC response was adopted at Plenary 4 2020, the main points being as follows:

- Additional measures supporting broadband rollout (section 2): BEREC describes measures which have been adopted by some NRAs (e.g. pricing flexibility for FTTH/B-based retail products). The establishment of dispute settlement bodies (DSBs) and single information points (SIPs) under the Broadband Cost Reduction Directive (BCRD) also contributed to broadband rollout.

- Role of the NRAs (section 3): the involvement of NRAs in state aid regulation is only recommended in the Broadband State Aid Guidelines and only partly foreseen in the General Block Exemption Regulation (GBER). NRAs have comprehensive expertise in wholesale regulation, and the overlap between state aid rules, the BCRD and sector regulation is significant. Therefore, BEREC considers that the revised state aid rules should enhance the involvement of NRAs.

- Definitions of next generation access (NGA) networks and next generation networks (NGN) (section 4 and question 27): the distinction between basic broadband and NGA is no longer relevant in light of the Gigabit Society Communications (GSC) objectives. Only some types of NGA networks meet the GSC objectives. BEREC points out that fixed very high capacity networks are in particular capable of contributing to the GSC objectives.

- Mapping (section 6): while the guidance on mapping provided under state aid rules was sufficient in principle, some problems are highlighted. BEREC points out that the guidance should be consistent with Article 22(1) EECC and the BEREC guidelines on geographical surveys BoR (20) 42 wherever possible.

- Competitive selection procedure (section 9): it is important to impose the full range of access products on SMP operators receiving state aid to avoid strengthening their position. SMP, and state-aid obligations should be synchronised to some degree.

- Technology neutrality (section 10): BEREC raises awareness that more pro-competitive technologies (e.g. P2P fibre) are often not sufficiently taken into account by granting bodies when deciding on tenders. The decisions often seem mostly to be based on the lowest costs for rollout.

- Wholesale access (section 11): BEREC deems it important that a full set of access products should be imposed on the beneficiary. The granting of access to civil infrastructure can enhance deployment of alternative fibre networks and this should be unlimited. The possibility of postponing access in the case of lack of reasonable demand is regarded as appropriate.

- Wholesale pricing (section 12): the guidance provided on wholesale pricing is sufficient. NRAs are best placed to develop pricing methodologies and to set prices. Consistency with sector regulation and the BCRD is important. This should result in a further strengthening of the involvement of NRAs.

Document:

BoR (20) 226: BEREC response on the targeted public consultation on the evaluation of the state aid rules for the deployment of broadband networks

2.1.4. Carry-over work on the Guidelines for geographical surveys of network deployments

Article 22(1) EECC states that NRAs and/or Other Competent Authorities (OCAs) must, by 21 December 2023, conduct a geographical survey of the reach of electronic communications networks capable of delivering broadband, and must update it at least every 3 years thereafter. This geographical survey may also include a forecast of the reach of broadband networks, including very high capacity networks for a period determined by the relevant authority. According to Article 22(7), by 21 June 2020, BEREC must, after consulting stakeholders and in close cooperation with the European Commission and relevant national authorities, issue guidelines to assist NRAs and/or OCAs on the consistent implementation of their obligations under that article.

Throughout 2020, BEREC worked in three areas: first, BEREC finalised the Core Guidelines (BoR (20) 42), which had been submitted for public consultation in the last quarter of 2019 and provide guidance on common approaches for developing Article 22 geographical surveys of broadband reach; second, BEREC developed Guidelines for the consistent implementation of Article 22(2), (3) and (4); and, third, it delivered Guidelines for the verification of information included in the Article 22 surveys of current broadband reach.

The BEREC Guidelines on geographical surveys of network deployments (the Core Guidelines) were approved for publication in March 2020. The Guidelines describe the information that Article 22 surveys must provide (generally QoS-1 information, i.e. calculated availabilities of service and calculated network performance information, as opposed to measurements of coverage or performance), and include specific definitions for the main indicators. The Guidelines also specify the minimal granularity of the data from a geographical standpoint to be considered for each piece of information collected (e.g. forecast/current surveys, fixed/mobile broadband services) and offer guidance regarding the publication and provision of data to third-party users, taking into consideration confidentiality concerns and possible aggregations of data.

The Guidelines on Article 22(2), (3) and (4) were published for public consultation in October 2020. Article 22(2), (3) and (4) provide a new policy that NRAs/OCAs may use to submit relevant information regarding investment opportunities to the market, and to gain information on future deployments. These BEREC Guidelines are aimed at providing a common understanding of these provisions, guidance on how to designate areas and on the procedures to be followed in publishing information and inviting agents to declare their intentions to invest, in order to ensure that such procedures are efficient, objective, transparent and non-discriminatory, with no undertaking being excluded a priori (as required by Article 22(4) EECC). They were adopted in March 2021.

In 2020, BEREC also worked on the Guidelines for the verification of quality and coverage information that the Core Guidelines provide for. The reliability and quality of the information provided from the geographical surveys of network deployments are important for many regulatory and policy functions, such as the provision of public funds to deploy broadband networks and the delivery of national broadband plans. The draft Guidelines were approved for public consultation in December 2020. They provide a description of the different methods by which NRAs/OCAs may ensure the quality of the information, and contain requests that the authorities discuss methodologies with the relevant stakeholders and be transparent with regard to the methodologies and the outcomes of the verification exercises. BEREC is to deliver the final Guidelines on verification in Q2 2021, after having taken the public consultation submissions into account.

Documents:

BoR (20) 168: Draft BEREC Guidelines on Geographical surveys of network deployments Article 22 (2), 22 (3) and 22 (4)

BoR (20) 230: Draft BEREC Guidelines on Geographical surveys. Verification of information

2.1.5. Carry-over work on the Guidelines on very high capacity networks

One of the objectives of the EECC (Article 3(2)(a)) is to ‘promote connectivity and access to, and take-up of, very high capacity networks’, and several provisions refer to the term ‘very high capacity network’. For example, the EECC defines a specific regulatory treatment of very high capacity network elements (Article 76), and the conditions under which NRAs must not

impose certain obligations on wholesale-only undertakings depend on access to a very high capacity network (Article 61(3)(a) in connection with Article 80).

The EECC (Article 82) provides that, 'by 21 December 2020, BEREC shall, after consulting stakeholders and in close cooperation with the Commission, issue guidelines on the criteria a network is 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, and latency and its variation.' The Guidelines issued by BEREC are designed in accordance with Article 82 EECC, and NRAs must take these Guidelines into utmost account. The Guidelines must contribute to the harmonisation of the definition of the term 'very high capacity network' in the EU.

The term 'very high capacity network' is already defined in the EECC (Article 2(2) and recital 13), and the criteria defined in the Guidelines follow this definition, as well as using data collected from network operators. The Guidelines define that any network which fulfils one (or more) of the following four criteria is a very high capacity network:

- Criterion 1: any network providing a fixed-line connection with a fibre roll-out at least up to the multi-dwelling building. For example, this criterion is fulfilled in the case of fibre to the building (FTTB) and also in the case of fibre to the home (FTTH).
- Criterion 2: any network providing a wireless connection with a fibre roll-out up to the base station. For example, this criterion is fulfilled in the case of mobile networks with fibre roll-out up to the base station or a public WLAN (WiFi) network with fibre roll-out up to the access point.
- Criterion 3: any network providing a fixed-line connection which is capable of delivering, under usual peak-time conditions, services to end-users with a certain quality of service (see table below).
- Criterion 4: any network providing a wireless connection which is capable of delivering, under usual peak-time conditions, services to end-users with a certain quality of service (see table below). The threshold values refer to outdoor locations only and to the average value within the coverage area considered.

Quality of service parameter	Fixed (criterion 3)	Wireless (criterion 4)
Downlink data rate	≥ 1000 Mbps	≥ 150 Mbps
Uplink data rate	≥ 200 Mbps	≥ 50 Mbps
IP packet error ratio	≤ 0.05%	≤ 0.01%
IP packet loss ratio	≤ 0.0025%	≤ 0.005%
Round-trip IP packet delay	≤ 10 ms	≤ 25 ms
IP packet delay variation	≤ 2 ms	≤ 6 ms
IP service availability	≥ 99.9% per year	≥ 99.81% per year

The draft Guidelines on very high capacity networks were approved for public consultation at Plenary 1 2020. The public consultation ran from 10 March to 30 April 2020, and BEREC received 34 responses from stakeholders. The final Guidelines and a report on the outcome of the public consultation were adopted at Plenary 3 2020 and published on 1 October 2020.

Documents:

BoR (20) 164: BEREC Report on the outcome of the public consultation on draft BEREC Guidelines on very high capacity networks

BoR (20) 165: BEREC Guidelines on very high capacity networks

2.1.6. Carry-over work on Guidelines on the identification of the network termination point

The EECC (Article 61(7)) stipulates that 'by 21 June 2020 in order to contribute to a consistent definition of the location of network termination points (NTPs) by NRAs, BEREC must, after consulting stakeholders and in close cooperation with the Commission, adopt guidelines on common approaches to the identification of the NTP in different network topologies.' The Guidelines issued by BEREC are designed in accordance with Article 61(7) EECC, and NRAs must take utmost account of these Guidelines when defining the location of NTPs. The Guidelines must contribute to the harmonisation of the location of NTPs in the EU.

The Guidelines are structured in three sections. The first section, 'General aspects', provides information on some general aspects, such as the boundary function of NTPs and the impact of the NTP location on the telecommunications terminal equipment (TTE).

The second section, 'Location of the fixed NTP', defines the criteria NRAs must take into utmost account when defining the location of the fixed NTP. The first criterion is 'Conformity of the definition of the fixed NTP location with the legal provisions' and in particular with the access regulation in the EECC, and the definition of the terms 'NTP' and 'local loop' in the EECC, Regulation (EU) 2015/2120 and Directive 2008/63/EC. The second criterion is 'Impact on TTE market', and the Guidelines analyse this impact for three different NTP locations (A, B and C).

The third criterion is 'Assessment whether there is an objective technological necessity for equipment to be part of the public network'. The Guidelines foresee that NRAs must carry out such an assessment and must in particular consider the following criteria:

- interoperability between the public network and the TTE;
- the simplicity of the operation of the public network;
- network security;
- data protection;
- local traffic;
- fixed line services based on wireless technology.

If, according to the outcome of the NRA assessment, there is an objective technological necessity for a piece of equipment at the customer's premises to be part of the public network, then it is part of the public network, otherwise it is part of the TTE. The third section is 'Location of the mobile NTP', which foresees that NRAs must determine that the mobile NTP is at a location (e.g. the air interface between mobile equipment and the base station) which permits end-users to (continue to) use their own mobile equipment.

The draft Guidelines on 'network termination points' were approved for public consultation at Plenary 3 2019. The public consultation ran from 7 October to 21 November 2019, and BEREC received 68 responses from stakeholders. The final Guidelines and a report on the outcome of the public consultation were adopted at Plenary 1 2020 and published on 5 March 2020.

Documents:

BoR (20) 45: BEREC Report on the outcome of the public consultation on draft BEREC Guidelines on common approaches to the identification of the network termination point in different network topologies

BoR (20) 46: BEREC Guidelines on common approaches to the identification of the network termination point in different network topologies

2.1.7. Carry-over work on Guidelines on the criteria for a consistent application of Article 61(3)

The EECC (Article 61(3)) foresees that 'by 21 December 2020, BEREC must publish guidelines to foster a consistent application of this paragraph [paragraph 3 of Article 61], by setting out the relevant criteria for determining

(a) the first concentration or distribution point;

(b) the point, beyond the first concentration or distribution point, capable of hosting a sufficient number of end-user connections to enable an efficient undertaking to overcome the significant replicability barriers identified;

(c) which network deployments can be considered new;

(d) which projects can be considered small; and

(e) which economic or physical barriers to replication are high and non-transitory.'

The Guidelines issued by BEREC define the criteria for determining the legal concepts listed in points (a) to (e) above, and the main points are as follows.

(a) A concentration or distribution point is defined as any point where traffic or lines are aggregated or disaggregated. The first concentration or distribution point should be determined as the first point inside or outside a building which is physically accessible or can be made physically accessible without unreasonable effort by the access provider and can be unbundled without unreasonable effort by the access seeker. The point should be situated reasonably close to the end-user.

(e) High and non-transitory economic or physical barriers include obstacles of an economic or physical nature which deter an efficient operator from replicating a network or part of a network. High economic barriers are likely to exist if costs, especially for civil engineering, are high and sunk and the prospect of cost recovery is low. Economic or physical barriers are non-transitory if the economic or physical obstacles identified are unlikely to disappear or significantly diminish in the short term.

(b) The 'point beyond' is the point closest to the end-user that provides for a commercially viable business case. A business case is commercially viable if it allows an efficient access seeker to attain sufficient revenue that at least equals the expected incremental costs for the network deployment and thus would allow an efficient access seeker to overcome the high and non-transitory economic or physical barriers identified by the NRA.

(c) The aim of the exemption for 'new' networks is to preserve a first mover advantage. Network deployments can be considered to be new if service provision to customers started no longer than 5 years ago. Upgrades of existing networks are normally not regarded as being 'new' network deployments, except in certain cases described in the Guidelines.

(d) The only projects regarded as small are those carried out by undertakings of a limited size on the broadband market. Projects carried out by undertakings with less than 500 potential end-users connected to their network are generally considered to be small.

The draft Guidelines on the criteria for a consistent application of Article 61(3) were approved for public consultation at Plenary 2 2020. The public consultation ran from 16 June to 31 July 2020, and BEREC received 19 responses from stakeholders. The final Guidelines and a report on the outcome of the public consultation were adopted at Plenary 4 2020 and published on 10 December 2020.

Documents:

BoR (20) 224: BEREC Report on the outcome of the public consultation on the draft BEREC Guidelines on the criteria for a consistent application of Article 61 (3) EECC

BoR (20) 225: BEREC Guidelines on the criteria for a consistent application of Article 61 (3) EECC

2.1.8. Carry-over work on Guidelines on the consistent application of the conditions and criteria for assessing co-investments in new very high capacity network elements

Article 76 EECC addresses the regulatory treatment of new very high capacity network elements. According to this article, undertakings which have been designated as having significant market power in one or several relevant markets in accordance with Article 67 EECC may offer commitments in accordance with the procedure set out in Article 79, and subject to a series of conditions to open the deployment of a new very high capacity network consisting of optical fibre elements up to the end-user premises or base station, to co-investment. When NRAs assess these proposed commitments, they must determine whether the offer to co-invest meets the specific cumulative conditions set out in

Article 76(1)(a) to (e) in order to decide not to impose any additional obligations pursuant to Article 68 with regard to the parts of the new very high capacity network that are subject to the commitments. This set of cumulative conditions expressed in Article 76(1) is further refined in Annex IV of the EECC.

BEREC is required under Article 76(4) EECC to publish guidelines to foster the consistent application by NRAs of the conditions to be met when assessing co-investment offers as set out in Article 76(1) and Annex IV of the EECC. In developing the Guidelines, BEREC considered the requirements of Article 76 and Annex IV as well as the relevant recitals of the EECC relating to co-investment, namely recitals 181, 198, 199, 200 and 201.

For preparing these draft Guidelines, BEREC organised two stakeholders' workshops with the main organisations in the sector (March 2019 and January 2020) to collect their views on the issues to be addressed in the Guidelines. The corresponding draft Guidelines were published for open consultation from 16 June 2020 to 4 September 2020, and BEREC published the definitive Guidelines (BoR (20) 232) in December 2020, together with the report of the outcome of the public consultation (BoR (20) 231).

These Guidelines will be used by NRAs as a reference for consistent application of the conditions and criteria for assessing co-investments addressed in Article 76(1) and Annex IV.

BEREC intends to report on the practical application of these Guidelines in accordance with Article 4(1)(j) of the BEREC Regulation. This report will provide input to an assessment of the need to revise the Guidelines. This assessment could be undertaken 5 years following the adoption of the Guidelines.

Documents:

BoR (20) 231: BEREC Report on the outcome of the public consultation on the Draft BEREC Guidelines to foster the consistent application of the conditions and criteria for assessing co-investments in new very high capacity network elements (Article 76 (1) and Annex IV EECC)

BoR (20) 232: BEREC Guidelines to foster the consistent application of the conditions and criteria for assessing co-investments in new very high capacity network elements (Article 76 (1) and Annex IV EECC)

2.2 Monitoring potential bottlenecks in the distribution of digital services

2.2.1 Updated BEREC Guidelines on intra-EU communications

According to the BEREC regulation amending the Telecoms Single Market (TSM) Regulation, BEREC must draft Guidelines laying down criteria for NRAs assessing derogations for regulated intra-EU call communications. In addition, BEREC provides guidance on the application of the TSM Regulation to ensure consistent implementation in the EU/EEA. In March 2019, BEREC published its Guidelines on intra-EU communications (BoR (19) 35).

In March 2020, 1 year following their publication, BEREC decided to review the Guidelines and launched a public consultation, during which six contributions were received. BEREC

amended its draft Guidelines after having carefully considered these contributions. The updated Guidelines were published in October 2020, together with the BEREC report on the outcome of the public consultation on the updated BEREC Guidelines on intra-EU communications.

Document:

BoR (20) 155: BEREC Guidelines on Intra-EU communications

2.2.2 Intra-EU communications BEREC Benchmark Report, April 2019 - March 2020

In accordance with 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 the market and price developments for regulated intra-EU communications and report to the European Commission.

In October 2020, BEREC published its first intra-EU communications BEREC Benchmark Report, covering the period April 2019 - March 2020 and including information about volumes, revenue and subscribers of intra-EU communication services. BEREC also collected data for a 6-month period (1 October 2018 - 31 March 2019) before the implementation of this regulation; therefore, for reasons of comparability, some figures in the report also include data from operators during this earlier period.

Document:

BoR (20) 156: Intra-EU communications BEREC Benchmark Report April 2019 – March 2020

2.2.3 Workshop on harmonised data collection regarding over-the-top (OTT) services

In November 2020, BEREC organised a workshop on harmonised data collection regarding number-independent intrapersonal communications services and video-streaming services. The workshop was the last of the several occasions where BEREC engaged with stakeholders to deliver on a list of indicators that NRAs may consider collecting in the future, which should be reflective of NRA needs for information and, at the same time, be possible for the providers to provide data. Therefore, a workshop was organised to enable BEREC to discuss the metrics proposed or possible alternatives and to allow BEREC to further judge the proportionality of the data requests.

Earlier, given the new competences with respect to data collection provided by the European Electronic Communications Code (EECC), BEREC had identified unavailable data that NRAs may need in order to perform their tasks (i.e. under their current legal mandate) and concluded on the specific services and indicators of interest. According to NRAs, the main reason for the data collection is the need to obtain information for assessing the impact of the services identified on electronic communication services; for defining relevant markets; and, more

generally, for the supervision and monitoring of electronic communications markets. Furthermore, the information is necessary to maintain a level playing field and assess interoperability, e.g. in the context of end-to-end connectivity and emergency services.

In order to prepare the workshop, BEREC issued an open questionnaire in 2020 which sought companies' views on various indicators. Eight entities replied to the questionnaire, including number-independent interpersonal communications (NI-ICS) providers, video-streaming providers and trade associations. BEREC took all the questionnaire responses into account when drawing up a provisional list of indicators for discussion in the workshop.

In March 2021, BEREC published an updated report on the issue, for public consultation, entitled 'Draft report on harmonised definitions for indicators regarding OTT services, relevant to electronic communication markets'. In drafting this report, BEREC took into account the views of the 112 participants in the workshop, including NI-ICS providers, video-streaming services, operators and regulators from all over the world, including the ITU, the European Regulators Group for Audiovisual Media Services (ERGA) and the OECD. The final list of indicators and their definitions is expected to be finalised and published in Q3 2021.

Document:

BoR (20) 167: BEREC Internal Report in preparation of 'The Workshop on a harmonised data collection regarding OTT services'

2.2.4 BEREC study on consumer behaviour and attitudes towards digital platforms

Digital platforms are an increasingly important part of the European digital economy. This raises many policy questions, such as how market power is distributed, whether the current competition policy remains valid, how potential bottlenecks can be addressed in relation to digital platforms and what kind of services digital platforms provide.

The objective of the study was to provide an evidence-based understanding of the interaction between consumers and digital platforms, and to determine how this affects consumer demand for electronic communication services. The study will provide empirical insight into consumer perception, behaviour and attitudes relating to digital platforms as enablers of communication services. It focuses on platforms that provide services for interpersonal communication and those that primarily facilitate interactive exchange of information and media. The study will also examine consumer switching between traditional electronic communication services and digital platforms, how frequently they change services and/or platforms, and the reasons behind such behaviour.

The project comprises the following:

- exploratory desk research to identify the key relevant platforms, earlier research findings, gaps, and other matters;

- an online panel survey of over 12,000 European consumers in 12 BEREC member and observer countries, with a representative sample in terms of age group, gender, level of education and income;
- interviews and work with the target group to gather information on participants' understanding of the issues that the study focuses on, and to test and improve the survey questionnaire;
- a comprehensive analysis, based on the previous points, and a list of a number of policy questions generated by the findings of the study.

2.2.5 Carry-over work on the data economy BEREC response to the public consultations on the Digital Services Act package and the New Competition Tool

On 2 June 2020 the European Commission launched two public consultations on the Digital Services Act (DSA) and the New Competition Tool (NCT) as part of its evidence-gathering exercise to identify issues that may require intervention at EU level in relation to digital services and online platforms. BEREC responded to these public consultations in September 2020.

Building on the previous work done on digital platforms and on its long experience in the ex-ante regulation of electronic communications services, BEREC acknowledged that there are increasing concerns over the entrenched power of some large digital platforms and the control they exert over an all-encompassing variety of goods, services and information, as well as over inputs and assets, which are crucial to fostering effective competition and innovation. BEREC put forward proposals for an asymmetric regulatory intervention aimed at ensuring that competition and innovation are encouraged, end-users' rights are protected and the digital environment is kept open and competitive.

BEREC also identified a set of structural and behavioural concerns raised by specific digital platforms that may have negative effects on competition dynamics, users and society at large, and proposed a model for regulatory intervention, including the identification of digital platforms with significant intermediation power, the types of measure to address the concerns, and a possible architecture for the regulatory governance.

BEREC further developed its proposals in a report on the ex-ante regulation of digital gatekeepers, published in 2021.

Document:

BoR (20) 138: BEREC Response to the Public Consultations on the Digital Services Act Package and the New Competition Tool

2.3 Enabling 5G and promoting innovation in network technologies

2.3.1. Peer review process

BEREC and the Radio Spectrum Policy Group (RSPG) agreed working arrangements on 13 June 2019 (see also BoR (19) 100). The arrangements set out cooperation methods for BEREC's participation in the Peer Review Forum. This was done with regard to the requirements of Article 35 of the European Electronic Communications Code (EECC). The cooperation methods are as follows:

- to use the Peer Review Forum as an instrument of peer learning;
- to promote the view that the Peer Review Forum brings greatest benefit 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. BEREC experts participated in two Peer Review Forums held virtually during the year in Ireland (June 2020) and Spain (December 2020).

2.3.2. Workshop on mobile infrastructure sharing

Following the 2019 Common Position on mobile infrastructure sharing, and due to the high level of stakeholder interest in this project, BEREC organised a workshop to enable discussion with stakeholders on BEREC's work and on possible future developments of the Common Position.

The workshop was well attended, with 110 participants from 21 stakeholders and 22 NRAs. 10 stakeholders shared their views on the topic and addressed questions that BEREC had set out in advance (covering everything from 5G rollout, 5G sharing challenges/opportunities/ trends to sharing in the context of small cells).

One of the conclusions drawn is that BEREC remains reasonably satisfied that the definitions, objectives and non-exhaustive list of assessment factors set out in the 2019 Common Position remain valid and there is no urgent need to update them.

Document:

BoR (20) 240: Summary Report on the Outcomes of Mobile Infrastructure Sharing Workshop

2.3.3. Report on security issues relating to 5G implementation

In January 2020, the Network and Information Systems Cooperation Group (NIS CG) published the 'Cybersecurity of 5G networks – EU Toolbox of risk mitigating measures' ('5G Toolbox'), which identifies a common set of measures.

In order to assess the progress of the implementation of the 5G Toolbox among Member States, BEREC set a task for its ad hoc working group on 5G cybersecurity ('ad hoc WG'). The outline of this activity was coordinated with the NIS CG and the European Commission, for BEREC to contribute to the implementation of Strategic Measures (SM) SM05 and SM06 of the 5G Toolbox. The ad hoc WG mapped the state of play in Europe concerning SM05 and SM06 implementation in the report. The report was created as (a) an internal BEREC document, and (b) an input to the NIS Cooperation Group as part of its review of the implementation of the 5G Toolbox across Europe.

BEREC gathered information for Part A of this report from 25 BEREC member NRAs, 24 of which were EU NRAs and one a non-EU NRA.

Part B of the report outlines the response to the questionnaire completed by 89 Mobile Network Operators (MNOs) from across Europe. This section of the report maps views of the MNOs on SM05 and SM06. In addition, the state of play regarding the diversity of the vendors in the MNOs networks is investigated.

Part C of the report presents important points stemming from the responses submitted by NRAs and MNOs.

Part D summarises the open issues across the countries and MNOs and the general situation in the European Single Market as presented in the questionnaire responses.

A publicly available report of BEREC's recent activities concerning the EU 5G Cybersecurity Toolbox Strategic Measures 5 and 6 (Diversification of suppliers and strengthening national resilience) was adopted by BEREC and contains the main findings.

Documents:

BoR (20) 227 Internal Report on the EU 5G Cybersecurity Toolbox SM05 and SM06

BoR (20)228 Report of BEREC recent activities concerning the EU 5G Cybersecurity Toolbox Strategic Measures 5 and 6 (Diversification of suppliers and strengthening national resilience)

2.3.4. Carry-over work on the impact of 5G on regulation

BEREC had intended to hold a workshop on the impact of 5G on regulation and the role of regulation in enabling the 5G ecosystem in March 2020. This workshop was postponed due to the COVID-19 outbreak (indeed, BEREC postponed a number of such events out of caution in March and April 2020). In view of this, and as it was not possible to reschedule the workshop in 2020, and thus not gather stakeholder input in the preferred manner, BEREC also postponed the report.

2.4 Fostering a consistent approach to the open internet principles

2.4.1 The implementation of Regulation (EU) 2015/2120 and BEREC Guidelines on the implementation of the Open Internet Regulation

In 2020, BEREC published its fourth Report on the implementation of Regulation (EU) 2015/2120 and BEREC Net Neutrality Guidelines. This report gives an overview of the activities of the NRAs from 1 May 2019 to 30 April 2020. BEREC gathered information from 28 NRAs by means of an internal questionnaire.

Regarding end-users' rights to open internet access, zero-rating offers were identified by almost all (26) NRAs, with music/video streaming and social networking being the most frequently mentioned types of applications being zero-rated. All but three (25) NRAs assessed traffic management practices in one way or another, as an increasing number of NRAs have realised the importance of compliance with the regulation in this area. According to most NRAs, monitoring activities have become an ongoing activity, and the interaction with the internet service providers (ISPs) is evolving into a more mature phase.

Although ISPs have included speed information in their contracts in three out of four countries, it was only after the NRAs' intervention that this information complied with the regulation (the definitions tend to be rather vague and unclear). The majority of NRAs monitor end-user complaints regarding the performance of the Internet Access Service (IAS). Two thirds of NRAs (19 out of 28) offer an IAS quality monitoring mechanism to consumers. In terms of the application of Article 5 of the regulation, the report concludes that most NRAs monitor the availability of a high-speed internet access service, with the most popular approaches being information requests from ISPs or analysis of complaints and end-user reporting. Technical network monitoring follows closely in third place.

Furthermore, in 2020 NRAs had to deal with the effects which the COVID-19 crisis had on the management of the networks by IPSs. In a joint statement with the European Commission, of 19 March 2020, on how network operators are coping with the increased demand on network capacity, BEREC committed to a special reporting mechanism to ensure regular monitoring of the internet traffic situation in each Member State in order to be able to respond swiftly to capacity issues.

Finally, while the body of the implementation report reflects the incremental actions of the last 12 months (the most recent reporting period), Annex I sets out the most relevant activities, e.g. those that are still having an effect on the way an NRA currently regulates and monitors its markets.

In addition, a forum has been maintained among NRAs to (informally) discuss national cases and questions relating to the coherent application of the Open Internet Regulation, including cases of zero-rating and similar offers, and to gather information about IPv6 deployment. This workstream builds on the experiences from earlier years, and the information is also used to prepare an annual European net neutrality report.

A specific topic that was addressed in 2020 was the technical assessment of the traffic identification techniques in the context of zero-rating and similar offers, as well as in traffic management cases that implement different categories of traffic. NRAs shared knowledge

about zero-rating and similar offers and how zero-rated content and/or different categories of traffic are identified.

Document:

BoR (20) 166: BEREC Report on the implementation of Regulation (EU) 2015/2120 and BEREC Net Neutrality Guidelines

2.4.2 NRA deployment support and sharing of practical experiences of the Net Neutrality Measurement Tool

In 2020, BEREC:

1) supported NRAs in their national deployments and provided a forum for them to share internal information and exchanges of experience;

2) started to explore the best utilisation of existing measurement tools in terms of the NRAs' supervisory roles, e.g. consideration was given to further developing the measurement methodology regarding measuring the general quality of internet access services.

2.4.3 Carry-over work on updating the Guidelines on the implementation of the Open Internet Regulation

In 2019, BEREC arranged a stakeholder workshop, prepared the draft Guidelines for public consultation and, following the consultation, started to finalise the draft Guidelines and consultation report for publication. Based on the work carried out in 2018 and 2019, this workstream was finalised, and BEREC published the consultation report and the updated Net Neutrality Guidelines, which were renamed the BEREC Guidelines on the implementation of the Open Internet Regulation.

Documents:

BoR (20) 111 BEREC Report on the outcome of the public consultation on draft BEREC Guidelines on the Implementation of the Open Internet Regulation

BoR (20) 112 Update to the BEREC Guidelines on the Implementation of the Open Internet Regulation

2.5 Exploring new ways to boost consumer empowerment

2.5.1 Report on how to handle third-party payment charges on mobile phone bills

The European Electronic Communications Code (EECC) contains several measures aimed at promoting competition, the internal market and end-user interests in relation to Premium Rate

Services (PRS) and other services subject to pricing conditions. Pursuant to Article 115 EECC, Member States must ensure that competent authorities, in coordination with national regulatory authorities, are able to require providers of Internet Access Services (IAS) or publicly available number-based Interpersonal Communications Services (ICS) to make available free of charge the additional facilities listed in Annex VI to the EECC. Among these additional facilities, those that can be imposed in relation to PRS and Direct Carrier Billing (DCB) services include selective barring for outgoing calls or premium SMS or MMS and a facility to deactivate third-party billing.

The project relating to the handling of third-party payment charges on mobile phone bills, as outlined in the 2020/2021 BEREC Work Programme, requires BEREC to collect useful information to draft a report aimed at understanding:

- what charges are being collected on behalf of third-party providers using mobile phone bills, considering both pre-paid and post-paid contracts, and the related issues; and
- what provisions exist in advance of the introduction of the EECC and after the implementation of the regulatory framework.

To this end, BEREC prepared and sent out a questionnaire to NRAs and/or competent authorities in 2020 that included questions on the legal status of third-party services, the responsibilities of the NRAs and/or competent authorities, the value chain and the scope of legal/regulatory obligations. The questionnaire also sought information on current consumer protection measures and complaints, complaints procedures and refunds. The questionnaire was sent out to NRAs on 15 September 2020 with a response deadline of 14 October 2020.

This report provides an overview of the status of third-party payment charges in Member States at the time of completing the questionnaire. Since the transposition process for Directive 2018/1972 (EECC) is still ongoing, the report may be considered as an initial frame of reference in the field of third-party payment charges for providing a more accurate assessment of the impact of the EECC once the transposition processes have been completed. The report will be discussed by the Board of Regulators at Plenary 1/2021 and submitted for public consultation. The final report and a report on the results of the public consultation is due by Plenary 3/2021.

2.5.2 Report on penalties

The End Users Expert Working Group (EWG) carried out an internal analysis of the rules on penalties applicable in the countries of all its members, as advised in its Work Programme 2020. The analysis was based on national telecommunications legislation in force at the time of the report, pursuant to the directives of the former Telecom Package 2002, as amended in 2009, that were transposed into national legislation. A public version of the document was published in December 2020.

Concerning sanctioning procedural law, BEREC notes that, before the sanctioning procedure was launched, almost all NRAs carried out preliminary proceedings with the objective of investigating any facts that may have resulted in a finding of non-compliance with telecommunications requirements. It was noted that there was considerable diversity in the types of sanctions available to NRAs. The report indicated that over 50% of national legislation

did not rank infringing conduct according to its gravity. Of those that did, the report confirmed that there was considerable variation in the classification of infringements, ranging from very serious to minor infringements.

When imposing a penalty most national legislators consider a subjective element and, when setting the amount of the penalty, a final adjustment can be made to ensure that it is equal to or higher than the minimum amount permissible in law and does not exceed the maximum amount permissible in law. Apart from four (4) national legislations, all national telecommunications regulatory frameworks set legal maximum or minimum caps on penalties.

Finally, BEREC points out that (i) there are no leniency programmes in force in relation to telecommunications infringements; and (ii) ACM (Netherlands), AGCOM (Italy), ComReg (Ireland) and BIPT (Belgium) have adopted and published guidelines setting out the criteria for the calculation of sanctions. BEREC notes that all national legislations – and thus independent NRAs – assess the rules on penalties in the context of 'general regulatory obligations' and the 'sector end users' obligations' under equivalent criteria.

Document:

BoR (20) 170: BEREC Report on Penalties

2.5.3 Carry-over work on Guidelines detailing Quality of Service parameters

In March 2020, the End Users EWG issued guidelines following a consultation process to provide guidance to NRAs in respect of the requirements of Article 104 EECC and to contribute to the consistent application of Article 104(2) and Annex X, with the aim of defining:

a) the relevant Quality of Service (QoS) parameters, including those relevant for end-users with disabilities;

b) the applicable measurement methods for these QoS parameters, including, where appropriate, the standards of the European Telecommunications Standards Institute (ETSI) and International Telecommunication Union (ITU), set out in Annex X of the EECC, in relation to interpersonal communications services (ICS) and internet access services (IAS), respectively;

c) the content and format of publication of the QoS information; and

d) the quality certification mechanisms.

The BEREC Guidelines document relied mainly on Annex X of the EECC that set out the QoS parameters, with additional details in respect of the definition and measurement method, where appropriate. In addition, the Guidelines introduce parameters not set out in Annex X of the EECC for response time for operator services (customer care services – help desk) and customer complaints resolution time, and parameters that are relevant for end-users with disabilities, namely voice communication, real-time text and video communication.

In respect of the publication of information, the Guidelines confirm that NRAs, in coordination with other competent authorities, could require service providers, in accordance with

Article 104(1) EECC, to publish information with regard to different levels of aggregation (regional, national) or different groups of end-users (business clients, consumers), depending on the level of availability of information to the public, QoS parameter or service. Finally, certification should ensure that quality monitoring fulfils the requirements of accuracy, comparability of measurements, openness, safety, future-proofness and accessibility. A review of the QoS parameters is due to begin in 2022.

Document:

BoR (20) 53: BEREC Guidelines detailing Quality of Service Parameters

2.5.4 Carry-over work on Guidelines on common criteria for undertakings other than ECN/ECS to manage numbering resources

This document sets out guidelines to assist Member States in the case where they decide to assign numbering resources to undertakings other than providers of electronic communications networks or services (non-ECN/ECS entities), in line with Article 93(2) EECC. This newly introduced piece of legislation is intended to take account of recent trends and address the potential demand for numbering resources from non-ECN/ECS entities. The demand for numbering resources has been dramatically increasing, mainly through the spread of Machine-to-Machine (M2M) services and the development of connected devices and products equipping wearables, cars, homes, buildings, etc.

The intensity of such growth is so significant that it could lead, in the medium term, to the scarcity of some numbering resources. A key feature of this high demand for numbers for the M2M service providers is that a significant proportion of connected devices and products should be able to freely circulate, and hence be able to connect locally to public electronic communications networks with suitable identifiers, such as numbering resources. The growth and innovative potential of M2M services relies on the setting of competitive market entry conditions, associated with the granting of numbering resources at consistent conditions throughout the Union.

Document:

BoR (20) 50: BEREC guidelines on common criteria for the assessment of the ability to manage numbering resources by undertakings other than providers of electronic communications networks or services and of the risk of exhaustion of numbering resources if numbers are assigned to such undertakings

2.5.5 Carry-over work on the report on Member States' best practices to support the defining of adequate broadband internet access service

The report on Member States' best practices to support the defining of adequate broadband internet access service is a requirement under Article 84(3) EECC, which states that: 'BEREC shall, in order to contribute towards a consistent application of this Article, 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 report describes and offers an insight into the practices of the nine Member States (Belgium, Croatia, Finland, Latvia, Malta, Slovenia, Spain, Sweden and the United Kingdom) which have introduced a broadband universal service obligation under the previous legislative framework (Directive 2009/136/EC), which included 'functional internet access' under universal service.

On the basis of the information provided by the NRAs of those nine Member States, the report outlines a set of common principles with respect to bandwidth, evaluation, eligibility designation mechanism, quality of service, monitoring of compliance and affordability measures, universal service providers and the nature of funding across Member States.

The report aims to contribute towards the consistent application of Article 84 EECC by Member States in the introduction of adequate broadband internet access service under universal service.

The report, drafted in close cooperation with the European Commission, in particular with regard to the data sources referenced in the report, was approved for public consultation by the Board of Regulators at Plenary 4/2019. The consultation ran from 11 December 2019 to 27 January 2020. The final report, which carefully considered the eight submissions received from the stakeholders, was approved in June 2020.

Documents:

BoR (20) 98: BEREC 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 (20) 99: BEREC Report on Member States' best practices to support the defining of adequate broadband Internet Access Service

2.5.6 Carry-over work on Guidelines on how to assess the effectiveness of public warning systems transmitted by alternative means to mobile NB-ICS

These Guidelines were provided by BEREC in response to the task set in Article 110(2) of the Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code (EECC), to assist Member States in assessing the effectiveness of alternative Public Warning Systems (PWS) using electronic communications services (ECS-PWS).

Essentially, the Guidelines set out a methodology that would only apply to Member States which intend to deploy ECS-PWS according to Article 110(2) EECC (110(2)-PWS). In particular, BEREC's methodology is based on a qualitative assessment of factors defining coverage and affecting the ability to reach concerned end-users. BEREC proposes that

competent authorities step through the methodology in order to assess the equivalence of effectiveness of the envisaged 110(2)-PWS against the benchmark 110(1)-PWS as follows:

- preliminary step (identifying suitable hypothetical benchmark systems): the competent authority identifies at least one hypothetical 110(1)-PWS that would comply with the legal requirements of Article 110(1) EECC;

- step 1 (benchmark creation): the competent authority assesses the performance of the hypothetical 110(1)-PWS identified at the preliminary step in terms of coverage and capacity to reach concerned end-users;

- step 2 (110(2)-PWS assessment): the competent authority assesses the performance of the envisaged 110(2)-PWS in terms of coverage and capacity to reach concerned end-users; and

- step 3 (equivalence assessment): the competent authority compares the performance of the envisaged 110(2)-PWS with the benchmark (i.e. the performance of the hypothetical 110(1)-PWS from step 1).

BEREC considers that this approach ensures that competent authorities perform the assessment in a similar fashion, but it necessarily also enables them to take national circumstances and the envisaged use of their PWS into consideration. What is important is that the steps themselves are harmonised, as this may increase certainty about the implementation of Article 110 EECC for competent authorities.

Document:
BoR (20) 115: BEREC Guidelines on how to assess the effectiveness of public warning systems transmitted by different means

2.6 BEREC obligatory work and engagement with stakeholders

2.6.1 COVID-19

After the COVID-19 pandemic reached Europe in March 2020, the European Commission and BEREC issued a joint statement on 19 March 2020 concerning the increased demand for network connectivity as a consequence of the pandemic. In the statement, the European Commission and BEREC set up a special reporting mechanism to ensure regular monitoring of the internet traffic situation in each Member State. The first Summary Report was issued on 24 March 2020.

From 7 May 2020, as the initial effect of the emergency on the networks stabilised, the twice-weekly BEREC reporting shifted to a weekly release, and the scope of the reporting was extended to the regulatory and other measures relating to the crisis. From 1 July to 31 December 2020 the weekly reporting period became a monthly reporting period. On 30 November 2020, an overview was released, which summarised the experiences relating to

the regulatory and other measures implemented in the European electronic communications market since the outbreak of the COVID-19 crisis. Overall, the reporting showed that there were no capacity issues and networks managed to cope well with the increased network traffic during the pandemic.

Documents:

BoR (20) 234: Overview of the Member States experiences related to the regulatory and other measures in light of the COVID-19 crisis.

BEREC Summary Reports on the status of internet capacity, regulatory and other measures in light of the Covid-19 crisis

European Electronic Communications Code (EECC)

2.6.2 Ad hoc input to the European Union institutions or NRAs

During 2020, BEREC engaged in a constant and fruitful dialogue to exchange views on a number of significant issues deriving from the implementation of the European Electronic Communications Code (EECC).

Against the background of such reflections, in August 2020 BEREC released a renewed Statement concerning the independence of NRAs. The new Statement aligns the existing documents to the new requirements established by the EECC concerning the regulatory stability and capacity of NRAs to exercise their tasks, free from any political pressure liable to jeopardise their independent assessment.

Document:

BoR (20) 141: BEREC Statement on the independence of national regulatory authorities

2.6.3 Database of E.164 numbers of European emergency services

Under Article 109(8) EECC, BEREC must maintain a database of E.164 numbers of Member State emergency services to ensure that they can contact each other from one Member State to another if another organisation does not maintain such a database.

Since 2019, BEREC has promoted exchanges with the CEPT/ECO [European Conference of Postal and Telecommunications Administrations / European Communications Office], with the purpose of assessing whether the existing database is in line with the legal requirements of the EECC. The Public Safety Answering Point Directory (PSAP-DIR), already maintained by the CEPT/ECO, has been operational since 1 December 2018, covering contact information for 18 PSAPs in 14 European countries. BEREC collected relevant information and carried out its analysis, drawing the conclusion that the database managed by ECO of CEPT met the requirements set in Article 109(8) EECC. BEREC noted that the registration of national

contacts in the database needed to be maintained to ensure adequate access to the relevant emergency services.

During May and June 2020, BEREC exchanged formal communications with ECO/CEPT with regard to the maintenance of the database. BEREC exchanged views with the Commission, took actions to help further populate the database of E.164 emergency numbers and is currently finalising a list of authorities competent to register PSAPs in the database.

Deliverable:

Database of E.164 numbers of European emergency services[37]

2.6.4 Database of numbering resources with a right of extraterritorial use within the European Union

In accordance with Article 93(4), BEREC has established a database on the numbering resources with a right of extraterritorial use within the Union to enable NRAs and Other Competent Authorities (OCAs) to check the undertakings' compliance with the conditions associated with using numbers. Each Member State must make available a range of non-geographic numbers to provide electronic communications services other than interpersonal communications services throughout the territory of the Union. In Member States that also opt to grant rights of use for numbering resources to undertakings other than providers of electronic communications networks or services, the abovementioned number ranges with a right of extraterritorial use may also be directly assigned to such undertakings.

NRAs/OCAs of each Member State must provide data and possible updates for all the number ranges with a country code of their own country with a right of extraterritorial use within the European Union / European Economic Area (EEA) in accordance with the internal procedures approved by the Board of Regulators in Plenary 4, according to schedule. The information processed is publicly available on the BEREC website[38].

Deliverable:

Database of numbering resources with a right of extraterritorial use[39]

2.6.5 List/snapshot of premium rate numbers / VAS number ranges in each EU Member State

Following up on its Opinion to the European Commission on the review of the Roaming Regulation (BoR (19) 101), BEREC has made publicly available a list of the value-added service (VAS) / premium number ranges in the EU to help address issues related to roaming-related fraud where visited networks find themselves unable to identify premium-rate numbers in the EU. The list of the VAS/premium number ranges in the EU was adopted at Plenary 4

[37] https://berec.europa.eu/eng/about_berec/tasks/numbering_db_for_extra_territorial_use/
[38] https://berec.europa.eu/eng/about_berec/tasks/numbering_db_for_extra_territorial_use/
[39] https://berec.europa.eu/eng/about_berec/tasks/numbering_db_for_extra_territorial_use/

and is maintained by the BEREC Office. The information processed has been published on the BEREC website.

Document:
BoR (20) 212: List/snapshot of premium rate numbers/VAS number ranges in each EU Member State

2.6.6 Informal network of fraud-related experts for dealing with possible future cases of fraud and misuse of numbers

In June 2020, BEREC completed the list of fraud experts to further cooperate on matters of fraud and misuse of numbering resources, by following up on the experience of implementing Article 28(2) of the Universal Service Directive (USD) (Article 97(2) EECC).

2.6.7 Carry-over work on the database on general authorisation notifications transmitted to competent authorities

Pursuant to Article 12(4) EECC, 'in order to approximate notification requirements' and harmonise the notification forms currently in use at national level accordingly, in December 2019 BEREC published Guidelines for the notification template (BoR (19) 259), i.e. guidelines outlining the main features and content of the notification form, within the constraints of Article 12(4), to be taken into account by Member States that envisage a notification requirement.

In 2020, the BEREC Office and BEREC developed the database for notification of general authorisations, according to the abovementioned Guidelines for the notification template. The BEREC Office released the database by 21 December, in line with the EECC's requirement that the notifications transmitted to the competent authorities by undertakings subject to general authorisation be uploaded from 21 December 2020. By 2021, the second phase of implementation of the database will be developed to allow the uploading of historic notifications (i.e. those made before 21 December 2020).

Deliverable:
Database on general authorisation notifications transmitted to competent authorities[40]

[40] https://gadb.berec.europa.eu/#!view=Providers&sort=ProviderName|ASC

2.6.8 BEREC input to the setting of single maximum EU-wide fixed/mobile voice termination rates

Article 75 EECC lays down that by 31 December 2020 the European Commission must, taking utmost account of BEREC's opinion, adopt a delegated act setting a single maximum EU-wide mobile voice termination rate (MTR) and a single maximum EU-wide fixed voice termination rate (FTR), sometimes referred to as the Eurorate. Accordingly, on 18 December 2020, the European Commission adopted a Delegated Regulation, which will be applicable to any operator providing mobile voice termination and fixed voice termination services within the EU.

In 2020, BEREC provided its opinion on the draft Delegated Act setting single maximum Union-wide voice fixed and mobile termination rates. The main points highlighted by BEREC in its opinion were the support of the general principle for defining mobile and fixed termination services along the numbers assigned to the provider of the called party, the final mobile termination rate and fixed termination rate proposed in the report, and the implementation of such rates through a glide path and transitional year, respectively.

However, BEREC sought clarification concerning the concept of 'calls originating and terminating in the Union' and the inclusion of associated facilities used for the provision of termination services under the Delegated Act. At the same time, BEREC requested that the European Commission consider the obligation for services with 'non-geographic numbers other than mobile numbers' (e.g. premium numbers, short codes and emergency telephone numbers such as 112) to be bound by the fixed Eurorate only where there is a genuine risk of excessive pricing.

Finally, BEREC understood the reasons put forward by the Commission to include incoming calls from third countries within the scope of the Delegated Act in certain cases. Yet it argued that there were practical difficulties that may impair these provisions, in particular with respect to Article 1(4a). Regarding the provisions of Article 1(4b), BEREC also raised questions about procedural issues and the criteria the Commission would use to establish the equivalence of third-country termination service costing methodologies with those described in Article 75 EECC.

Document:

BoR (20) 190: BEREC Opinion on the Draft Delegated Act setting single maximum Union-wide voice fixed and mobile termination rates

Roaming

2.6.9 BEREC input to the weighted average of maximum mobile termination rates across the European Union

According to Article 6e(2) of the Roaming Regulation, as amended, the European Commission must review the Implementing Acts annually, following consultation with BEREC, setting out the weighted average of the maximum mobile termination rates (MTRs). On 16 October 2020, BEREC provided input to the Commission on the weighted average of the maximum MTRs.

Document:

BoR (20) 185: BEREC input on weighted average of maximum mobile termination rates

2.6.10 International Roaming Benchmark Data Report

In accordance with Article 19 of the Roaming Regulation, BEREC must regularly monitor the retail and wholesale roaming prices for voice, SMS and data services, as well as the volume and revenue generated by mobile operators across Member States. Moreover, following the amendments to Article 19, BEREC must report regularly on the development of pricing and consumption patterns in the Member States for both domestic and roaming services, and on the development of actual wholesale roaming rates for unbalanced traffic between roaming providers. These benchmark data reports are widely acknowledged by the relevant stakeholders and are used by the Commission to review the effectiveness of the Roaming Regulation. BEREC published its 24th benchmark report in March 2020 and its 25th benchmark report in October 2020. Following the agreement signed on 4 April 2019, both reports contain a report on international roaming in the Western Balkans, attached as an annex.

Documents:

BoR (20) 31: International Roaming Benchmark Data Report April 2019 - September 2019

BoR (20) 157: International Roaming Benchmark Data Report October 2019 - March 2020 & 2nd Western Balkan Roaming Report

2.6.11 Transparency and comparability of international roaming tariffs

Pursuant to Article 19 of the Roaming Regulation, BEREC is responsible for regularly monitoring the transparency and comparability of roaming tariffs, and must present its findings in an annual report. The objective of the report is to monitor and increase consumer awareness of the wide range of roaming tariffs, to promote transparent market conditions, and to increase the ability of customers to make well-informed decisions. The report addresses the key issues of whether information on price and tariff conditions is made available in a clear and convenient manner, and whether consumers are able to compare those tariffs.

In July 2020, operators and regulators were asked several questions relating to these two key issues. BEREC published its eighth BEREC Report on the Transparency and Comparability of Tariffs in December 2020. The report covers the results of the questionnaire regarding the implementation of ‘Roam Like at Home’ (RLAH) with a fair-use policy and sustainability applications, in line with the amendments to the Telecoms Single Market Regulation. In the questionnaire for NRAs, BEREC sought information concerning the complaints relating to transparency issues that NRAs received between September 2019 and July 2020. The questionnaire for operators focused on obtaining information about the structure of tariffs for international roaming, the structure of alternative tariffs and non-roaming tariffs.

In addition, operators were asked questions regarding the information provided by operators in general for roaming and the available price comparison tools for international roaming. The

report shows that 21 derogation applications were received in 2020. Of these applications, 16 were granted.

Document:

BoR (20) 208: BEREC Report on Transparency and Comparability of International Roaming Tariffs

2.6.12 BEREC input to European Commission request for the preparation of the legislative proposal for the new Roaming Regulation

On 24 April 2020, BEREC received a letter from the European Commission requesting additional expert opinions for the preparation of the impact assessment and the legislative proposal for the new Roaming Regulation. This request was in addition to the input already submitted to the Commission in 2019.

BEREC provided detailed information about the costs/benefits of the Roaming Regulation, the Quality of Service (QoS) in roaming, Value-Added Services (VAS), the sustainability of RLAH and M2M services and permanent roaming. The Commission also requested information about the monitoring of free-of-charge access to the emergency service 112 and whether the COVID-19 crisis would impact the EEA international roaming market.

BEREC based its input mainly on the data collected via a joint Commission/BEREC survey among Mobile Network Operators (MNOs), Mobile Virtual Network Operators (MVNOs) and National Regulatory Authorities (NRAs) that was carried out in Q2 2020. In addition, BEREC sought input from NRAs on the emergency service 112 and Value-Added Services (VAS).

Document:

BoR (20) 131: BEREC input on EC request for the preparation of the legislative proposal for the new roaming regulations

Quality and efficiency

2.6.13 Termination rates at European level

BEREC constantly monitors domestic fixed and mobile termination rates in Europe and provides an overview report twice a year. Following interventions by NRAs in the two relevant markets, namely market 1, 'Wholesale call termination on individual public telephone networks provided at a fixed location', and market 2, 'Wholesale voice call termination on individual mobile networks', and the application of the Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU (Recommendation 2009/396/EC), the wholesale rates for both mobile and fixed interconnection have fallen significantly, and continue to decrease. Moreover, as laid down by the European Commission Delegated Act,

setting a single maximum EU-wide mobile voice termination rate (MTR) and a single maximum EU-wide fixed voice termination rate (FTR) by mid-2021, the rates would be capped at pre-established levels throughout the EU.

In July 2020, the simple European average of the lowest nationally regulated fixed termination rates (EU Member States only) stood at 0.1994 cents per minute.

MTRs have been regulated based on cost-oriented pricing in all EU-27 Member States for many years now, and most NRAs have implemented the Commission Recommendation, which established the pure long-run incremental cost (LRIC) as the cost standard to be applied, at wholesale level, to the interconnection service for voice calls in mobile networks. The European average of mobile wholesale termination rates fell substantially between July 2005 and July 2020: the simple average from 12.3 to 0.82 cents per minute, the weighted average[41] from 13.2 to 0.72 cents per minute, for all the 38 European countries from which data was collected. Finally, the analysis for the SMS termination services, which are unregulated, shows an average rate of 2.18 cents per message.

Documents:

BoR (20) 97: Termination rates at European level January 2020

BoR (20) 209: Termination rates at European level July 2020

2.6.14 Article 7/7A Phase II process

At the beginning of 2020, the European Commission launched a public survey on the proposed Recommendation for Internal Market Procedures under the European Electronic Communications Code (EECC). In response, BEREC addressed this matter within its annual workshop on whether there is a requirement to update the Article 7/7A (32/33 EECC) Phase II process in the context of the EECC, which was held in February 2020. The Commission's representatives attended the meeting and discussed the overall idea of a revised Recommendation, as well as clarifying several issues that were raised. Following this meeting, BEREC developed input to the public consultation, outlining the NRAs' views on possible changes to the current procedures relating to Article 7/7a (32/33 EECC). This workstream is being followed up in 2021.

Document:

BoR (20) 51: BEREC response to the Commission's consultation on the proposed Recommendation for Internal Market Procedures under the EECC

2.6.15 Report on regulatory accounting in practice

The report on regulatory accounting in practice gives an overview of the main remedies imposed on Significant Market Power (SMP) operators in relevant markets susceptible to

[41] The values of the national rates have been weighted by the corresponding number of subscribers, reflected by the corresponding market share.

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 16th annual report on regulatory accounting, and summarises the findings of a detailed survey of regulatory accounting systems across Europe. Information was gathered from the NRAs and covers the implementation of regulatory cost accounting methodologies. It includes the state of play in terms of remedies of market regulation and focuses on price control and the way in which it is defined in practice. The report also provides (i) information about the structural parameters of each country; and (ii) the weighted average cost of capital (WACC) methodologies applied by NRAs and WACC values currently in force.

The document offers an up-to-date factual report on the regulatory accounting frameworks implemented by NRAs and an assessment of the level of consistency achieved. Where possible, trends and comparisons with data collected in past years are shown.

The report focuses on the analysis of services in key wholesale markets: Wholesale Local Access (market 3a/2014), Wholesale Central Access (market 3b/2014) and Wholesale High Quality Access (market 4/2014).

Furthermore, as in last year's report, in order to include factors influencing the NRAs' regulatory strategies, additional structural data was collected from NRAs, such as population, market, competitive structure and infrastructure.

The report also looks at annualisation methodologies provided by NRAs. As in last year's report, accounting information for specific products in market 3a, such as copper access (including local loop unbundling (LLU), SA and sub-loop unbundling (SLU)), fibre access (LLU and virtual unbundled local access (VULA)), dark fibre access and duct access were further analysed.

The report includes an updated section on the current implementation of Recommendation 2009/396/EC of 7 May 2009 ('the Termination Rates Recommendation').

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

In Chapter 5 the report presents an extended survey of WACC parameters, mainly focusing on market 3a and on the mobile market. The WACC chapter summarises the main methodologies currently used by NRAs and sets out the reasons behind the estimation of single parameters needed to evaluate the cost of capital under the Capital Asset Pricing Model (CAPM).

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

As can be seen from the results, the report confirms the trend towards a consistent application of regulatory accounting frameworks by NRAs. This also reflects convergence in the application of the 2013 Recommendation on consistent non-discrimination obligations and costing methodologies. In 2021, the report will continue to look at the application of regulatory accounting with respect to key access products (e.g. fibre) and will maintain the detailed and in-depth analysis of the methods, as well as the national market situations in which they are applied. Furthermore, the focus of the report may need to be adapted in the light of the EECC provisions given that the EECC will have to be transposed by Member States by 21 December 2020. This means looking at which way NRAs will apply the updated provisions to deal adequately with developments in the markets and technology.

Regarding the WACC calculation, the report data will continue to be collected 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.

Document:

BoR (20) 210: BEREC Report Regulatory Accounting in Practice 2020

2.6.16 Weighted Average Cost of Capital (WACC) parameters calculation

The report on regulatory accounting in practice gives an overview of the main remedies imposed on Significant Market Power (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.

In the first BEREC Weighted Average Cost of Capital (WACC) Parameters Report, BEREC calculates the WACC parameters following the non-binding European 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 7 November 2019[42]. The cost of capital is the core element of any regulatory pricing decision taken by NRAs. The Notice aims to ensure a consistent calculation of the WACC by NRAs, and thereby contributing to the development of the internal electronic communications market.

BEREC applied three general principles:

- follow the Notice as closely as possible, which mainly refers to the methodologies to be used for the estimations;
- be transparent, using publicly available data wherever possible or using data which is widely used and accepted in the financial markets, which refers to the data sources to be used for the estimations;
- explain every step of the calculation and proceed in a straightforward manner, which refers to the calculations as such.

[42] https://ec.europa.eu/digital-single-market/en/news/commission-publishes-notice-calculation-cost-capital-legacy-infrastructure.

For each of the parameters of the WACC formula (using the CAPM approach) the report sets out:

- the application of the methodologies according to the WACC Notice,
- the assumptions and choices made,
- the data and data sources used,
- the steps of the calculations,
- the results.

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, also taking into account best regulatory practices where the Notice provides for NRA flexibility.

All results were cross-checked to ensure that no methodological mistakes had been made, no questionable data had been used and no calculation errors had occurred, so BEREC was able to exclude any systematic bias. Only after these checks had been carried out was BEREC satisfied that the results were correct and that NRAs would be confident to use them in their own WACC calculations.

The following table provides a summary of the structure of the WACC Parameters Report 2020, BEREC's calculations and (references to) the results derived therefrom:

Chapter	Parameter	Results	Reference (table)
Chapter 1	Introduction WACC formula		
Chapter 2	Risk-free rate (RFR)	RFR for each EU Member State	Table 2
Chapter 3	Peer group	BEREC Peer Group 2020, comprising 14 companies	Table 3
Chapter 4	Debt premium, Cost of debt	Debt premium, cost of debt for each of the 14 companies of the BEREC Peer Group	Table 4
Chapter 5	Equity beta, gearing and asset beta	Equity beta, gearing and asset beta for each of the 14 companies of the BEREC Peer Group	Table 6
Chapter 6	Equity risk premium (ERP)	EU-wide ERP	Tables 10 + 11

Chapter 7	Summary	All WACC parameters as calculated by BEREC	Tables 12 + 10

The novelty of the Notice and the WACC Parameters Report is the calculation of an EU-wide equity risk premium (ERP). Based on the calculations described in Chapter 6, BEREC considers that the appropriate value of the single EU-wide ERP is in the margin of 4.18% (GM) and 5.31% (AM).

BEREC will publish the estimated WACC parameter values, which NRAs are assumed to take into account when carrying out their own calculations for their national regulatory decisions; however, they do have some flexibility within this framework to take account of national specificities. To enable NRAs to use the parameter values, the report was to be published before 1 July 2020, the date on which the European Commission was to start applying the Notice when reviewing NRA's notifications in the EU electronic communications sector.

BEREC has taken utmost care to prepare this report according to the best knowledge and technical expertise of its members. Nevertheless, amendments may be necessary in the next annual update, as appropriate.

Document:

BoR (20) 116: WACC Parameters Report 2020

Communication and cooperation

2.6.17 BEREC Annual Reports for 2019

BEREC published its Annual Reports for 2019 on 11 June 2020. The Annual Report on developments in the electronic communications sector in 2019 had a foreword by the BEREC Chair 2019, Mr Jeremy Godfrey, who noted that 2019 demonstrated BEREC's ability to deliver on its commitments, and it would continue to play a vital role in contributing to the consistent application of the regulatory framework and serving as an independent advisory body to the co-legislators.

The BEREC Chair 2019 stated that BEREC's capacity was derived from the dedication, knowledge and competence of the Working Group Co-Chairs and the many experts drawn from all NRAs, who positively collaborated to strive for the best outcomes. This diversity of expert inputs gave BEREC its strength, and their ongoing contributions, coupled with positive engagement with the stakeholders, would continue to serve BEREC well into the future.

Document:

BoR (20) 96: BEREC Annual Reports for 2019

2.6.18 BEREC Communications Plan 2020

In an unprecedented year, BEREC continued to proactively communicate and engage with stakeholders. Communications activities were concentrated online, where BEREC's achievements and opinions were published and distributed through targeted and transparent communications.

Following the update of the BEREC External Communications Strategy in 2019, the Communications Plan for 2020 focused on preparatory work as the basis for the communications deliverables, with the purpose of engagement with the BEREC stakeholders. With a view to strengthening the perception of BEREC as an impartial, independent, European, forward-looking expert body, the tasks undertaken in 2020, as defined in the BEREC Communications Plan 2020, supported the planned communications campaign throughout the following year. The approach taken assists BEREC in reaching its strategic objectives such as promoting competition and investment, boosting the internal market and empowering and protecting end-users.

The BEREC Communications Plan 2020 included a communications campaign to inform the BEREC key target audiences of the potential of connectivity, thus reinforcing the work to achieve the connectivity objective, which is one of the four pillar objectives set out in the EECC. During the year, the Communications Expert Networking Group (ENG) prepared the campaign deliverables, which include a brand book, a brochure on connectivity, a connectivity presentation, a set of visuals, and other items. In the third quarter of 2020 an additional campaign was prioritised and planned on the topic of very high capacity networks, with another set of deliverables, including an explanatory factsheet, social media visuals, and others. It is planned that both campaigns will continue throughout 2021, with the aim of finalising all the deliverables and multiplying the information both to the defined target audiences and to the NRAs.

The planned communications and networking events, such as the post-plenary debriefings and the Stakeholder Forum continued, though instead of the usual physical events in Brussels became online meetings. Additionally, a joint webinar with the International Institute of Communications on 'Regulation in times of pandemic and lessons for the future: a European view' was held in May 2020. European regulators and policy-makers discussed their decisions and initiatives taken in response to the pandemic against the backdrop of consumer protection and universal access to essential information and services. Spectrum management, net neutrality regimes, novel health management apps, privacy protection and combatting disinformation were among the list of important topics for discussion.

2.6.19 Stakeholder Forum

These annual conferences always provide a good opportunity to feel the temperature in the room and provide valuable feedback from the industry on BEREC's work. However, due to the outbreak of COVID-19, BEREC organised two virtual stakeholder meetings in 2020, postponing events originally scheduled for April.

Since the main purpose of the BEREC Stakeholder Forum is to interact with our stakeholders, the date of 1 April 2020 was carefully chosen, to allow early engagement relating to the draft BEREC Work Programme 2021. Both the outline of the BEREC Work Programme 2021 and

the draft Strategy 2021-2025 were presented, followed by a discussion with stakeholders to receive valuable feedback on BEREC's work. The stakeholders asked a number of questions relating to BEREC priorities.

Later in the year, on 19 October 2020, the 8th BEREC Stakeholder Forum took place, to exchange ideas with stakeholders on BEREC'S work and plans, and to discuss matters relevant to the telecommunications market.

The Forum began with an introduction by the European Commissioner for Internal Market, Mr Thierry Breton. Commissioner Breton was very clear about what needs to be done: the acceleration of fibre deployment and the rollout of 5G networks. These investments will be implemented in light of the European Electronic Communications Code (EECC). According to Commissioner Breton, in order to mobilise investments, Europe needs an efficient system, including harmonised rules.

Mr Michel Van Bellinghen, the incoming Chair of BEREC, introduced the draft Work Programme 2021 along with future perspectives, while the BEREC Chair, Mr Dan Sjöblom, commented on the capacity of the telecommunications sector in handling the COVID-19 crisis. The first part of the event was wrapped up with a questions and answers session. The moderator, Mr Philippe Defraigne (Cullen International), facilitated stakeholders' engagement with the BEREC Chairs, by taking on board questions that had been sent in as well as live.

The main topic of the Forum was digital platform regulation. The rules to regulate digital platforms, namely the new rule book proposed by the European Commission in December 2020, was anticipated to be a major game changer for Europe, as well as for the rest of the world, for all players. Our keynote speaker, Professor Kovacic, explained that competition law is insufficient for addressing the problems in the market. He touched upon many related points such as data and consumer protection, and pointed prominently to ex-ante regulation. He raised many questions for BEREC to reflect on: changing the rules is not about European protectionism, but about creating accountability and transparency.

A discussion on the regulation of digital platforms followed with a number of distinguished speakers: Ms Ursula Pachl (The European Consumer Organisation, BEUC), Mr Benedikt Blomeyer (Allied for Startups), Mr Kay Jebelli (Computer and Communications Industry Association Europe, CCIA Europe), Mr Luc Hindryckx (European Competitive Telecommunications Association, ECTA) and Ms Lise Fuhr (European Telecommunications Network Operators' Association, ETNO). Mr Matthew Newman (MLex, a media organisation providing exclusive analysis and commentary on regulatory risk) moderated the panel discussion. During the panel debate, it was mentioned that the governance model of the Digital Services Act and Digital Markets Act (DSA/DMA) will not be easy to implement, but requires strong coordination between institutions in the Member States and at European level – a multi-layered model, as Commissioner Breton describes it. The closing remarks on the regulation of digital platforms were presented by Mr Roberto Viola, General-Director of DG CONNECT.

2.6.20 BEREC Strategy 2021-2025

BEREC plans its multiannual work around the four strategic objectives of the European Electronic Communications Code (EECC), and in the process gives special consideration to

the strategic priorities listed below, as well as the priorities set for institutional and international cooperation. These strategic priorities are based on the market developments outlined in the previous section and refer to areas of interest that BEREC should cover under the strategic objectives.

The BEREC Strategy, adopted by the Board of Regulators on 11 June 2020, covers a period of 5 years, instead of 3 years, namely 2021-2025. This extended period enables better alignment with the legislative cycle of the European Commission and the objectives and new priorities set out by President von der Leyen for the period 2019-2024. At the same time, the structure of the BEREC strategy reflects the three high-level strategic priorities of BEREC:

- promoting full connectivity (very high capacity networks (VCHN, 5G);
- supporting sustainable and open digital markets (including digital issues and open internet);
- empowering end-users (including the digital divide).

The high-level priorities are further subdivided into more concrete areas of interest to indicate the work BEREC intends to focus on. The strategic priorities will not define the full scope of BEREC's work for the 5-year period 2021-2025 but will be recurring topics in BEREC's work programme for the coming years.

The Strategy contains the following mission statement: 'BEREC aims at fostering the independent, consistent and high-quality regulation of digital markets for the benefit of Europe and its citizens.' It considers the impact of rapidly changing markets, new network technologies and expected policy developments in this period, as well as the increasing cross-border nature of digital services.

The public consultation was open until 13 April 2020. 17 responses were received in total. In accordance with BEREC's policy on public consultations, BEREC issued a report containing a summary of how stakeholders' views had been considered. This document summarises the responses received to the public consultation and presents BEREC's position with regard to the suggestions and proposals put forward in those responses, where relevant. Generally, the responses were both supportive and positive towards the work BEREC will engage in during 2021-2025. To ensure that the BEREC Strategy remains relevant and aligned with future developments, BEREC will revisit its strategic priorities over the course of the 5-year period.

Document:

BoR (20) 108: BEREC Strategy 2021-2025

2.6.21 BEREC Work Programme 2021

The BEREC Work Programme 2021 sets out the priority work areas that the Board of Regulators has identified for 2021. These areas may be complemented by other emerging topics of interest during the year. The objectives of the Work Programme are aligned with the BEREC Strategy 2021-2025, with a close focus on the three high-level priorities (promoting full connectivity, supporting sustainable and open digital markets and empowering end-users) and the priorities set for institutional and international cooperation.

The Work Programme also aims to reflect the priorities of the European Commission for the 2020-2024 legislative cycle and the policy objectives highlighted in the Commission's Communication on 'Shaping Europe's digital future' of 19 February 2020, including the 'Recovery Plan for Europe' from 27 May 2020.

Document:
BoR (20) 220: BEREC Work Programme 2021

2.6.22 Cooperation with EU institutions and institutional groups

In 2020, BEREC continued to work in close cooperation with the European Commission, both during its Plenary and Contact Network meetings, and on an ongoing basis with, for example, quarterly videoconference calls with the Director-General of DG CONNECT, Mr Roberto Viola. Engagement with the Commission included BEREC finalising its opinion on the fourth review of the Recommendation on relevant markets.

Additional cooperation between BEREC and European institutional groups in 2020 included a joint workshop on the issue of electromagnetic fields and authorisation of spectrum licences together with the Radio Spectrum Policy Group (RSPG), with which BEREC had signed a working arrangement on 13 June 2019. On the basis of this working arrangement, BEREC and the RSPG have continued their work to establish a non-binding mechanism for cooperation and the mutually beneficial exchange of information and ideas in the field of electronic communications policy at the level of the European Union. BEREC and the RSPG have agreed that BEREC participate in meetings organised by the RSPG to discuss and exchange views on draft measures relating to the authorisation of the use of radio spectrum, particularly within the forum of Peer Reviews, where expertise and experiences relating to authorisation are shared voluntarily between representatives from the two organisations.

Furthermore, in 2020 BEREC continued to develop its relationship with the European Union Agency for Cybersecurity (ENISA). Building on the establishment of the new BEREC ad hoc working group in 2019, the ad hoc 5G Cybersecurity Group, has continued to report on security issues relating to the implementation of the 5G Cybersecurity Toolbox (see above), in particular on the strategic measures referring to vendor diversity and resilience. In December 2020, BEREC organised a joint BEREC-ENISA workshop, attended by both the BEREC Chair and the Director of ENISA, presenting the result of the work done by the respective organisation during the past year and reaffirming the intent to continue to work together on cybersecurity in the future.

A list of the meetings that took place with the EU institutions and other EU bodies is available in Annex 1.

2.6.23 International cooperation

During 2020, BEREC continued to maintain, and indeed build on, its close relationships with regional regulator groups as well as further develop its connections with global organisations in the field of electronic communications regulation.

The BEREC Chair 2020, Mr Dan Sjöblom (PTS, Sweden) and the Vice-Chairs Mr Jeremy Godfrey (ComReg, Ireland), Mr Van Bellinghen (BIPT, Belgium), Dr Monika Karas (NMHH, Hungary) and Mr Tonko Obuljen (HAKOM, Croatia) accompanied by Mr Sasho Dimitrijoski (AEC, North Macedonia), Mr Ola Bergstrom (PTS, Sweden), the BEREC CN Chair 2020, and Mr Tom Boyce (ComReg, Ireland), travelled to the West Coast of the United States to meet senior policy-makers, technical and project leads from global industry stakeholders and academics who are leading research into self-programming networks. The trip, from Monday 20 January to Friday 24 January 2020, included a visit to Silicon Valley in the San Francisco area along with visits to San Diego and Los Angeles.

The West Coast of the United States has for many decades been a centre of innovation, and companies based there are often world leaders in their field. Therefore, it was decided that it would present the opportunity to explore topics that would previously have been considered adjacent to the telecommunications sector and, therefore, outside BEREC's remit, but which in a converging world are becoming more relevant. Meetings were held with representatives from Apple Inc., Stanford University, Microsoft, Cisco, Google, Facebook, Qualcomm, ICANN, SpaceX and AT&T, and discussions focused on gaining insights from large players of the digital economy with regard to evolving standards in telecoms, including joint standards for 5G networks, new network deployments, internet governance, convergence between content and telecoms providers as well as emerging technologies in telecoms networks deployment. A separate summary report[43] on the Study Trip was published in June 2020.

BEREC also continued to provide support to the European Commission regarding the Policy and Regulatory Initiative for Digital Africa (PRIDA) by hosting a workshop in September 2020, which aimed at establishing points of contact and exploring commonalities to facilitate further regulatory coordination between African and European regulators. The workshop was attended by representatives from African regional regulatory authorities (ARTAC, WATRA, EACO and CRASA), the African Union Commission (AUC), BEREC, the European Commission, and representatives from BEREC's MoU partners EaPeReg, Regulatel and EMERG. The workshop dealt with structural organisation of the respective bodies, which would allow for appropriate comparisons to guide the scope of future collaborative exercises between BEREC and PRIDA, which will continue in the future.

BEREC continued to engage with the EaPeReg countries through the EU4Digital Initiative, with the BEREC Chair Mr Dan Sjöblom (PTS, Sweden) and the Vice-Chair Mr Jeremy Godfrey (ComReg, Ireland) participating in the EaPeReg Plenary meetings as well as the EU4Digital Steering Committee meetings. Unfortunately, the biennial BEREC-Regulatel seminar, due to be hosted by Regulatel had to be postponed because of the travel restrictions that were in place at the time.

Nevertheless, in 2020 BEREC continued its commitment to strengthen its relationships with regulatory bodies beyond the European Union by renewing and extending its Memoranda of Understanding with the Telecom Regulatory Authority of India (TRAI) and the European Mediterranean Regulators Group (EMERG). Because of the travel restrictions in place at the time, these MoUs were concluded in 'virtual signing events' in December 2020, with the participation of the BEREC Chair, Mr Dan Sjöblom, the BEREC Vice-Chair, Mr Van Bellinghen

[43] https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/9279-report-on-berec-international-mission-to-the-usa

(BIPT, Belgium) and the Director of the BEREC Office, Mr László Ignéczi. TRAI and EMERG were also represented by their Chairs, Dr P.D. Vaghela and Dr Samer Ali (MTIT, Palestine), respectively.

2.7 BEREC work on sustainability

In 2020, BEREC proposed to address sustainability issues relating to the technical operations of BEREC / the BEREC Office and created an expert networking group (ENG) to propose adaptation to the BEREC work process.

In accordance with the BEREC Strategy 2021-2025 and in the context of the European Green Deal, BEREC considered that the ENG should assess the wider remit of the work of BEREC and the NRAs within the digital sector, in particular regarding the environmental impact of the electronic communications networks.

In order to position BEREC in relation to the European Commission's expectations on the sustainability of electronic communication networks and services, and to assess whether or not there is scope within the regulatory actions of NRAs to positively impact or minimise the negative impact of the sector on the environment, the ENG focused on developing the knowledge of the NRA experts and BEREC's about the environmental impact of the digital sector. Therefore, the ENG organised with the Chair's team two internal and virtual workshops on sustainability.

Those workshops took place in early October 2020 and became the occasions to inform the NRA experts about sustainability issues within the digital sector (in particular European networks), with special emphasis on methodological (or lack thereof) elements that are available to characterise the environmental impact of the digital sector (in particular in coordination with the work being carried out by the European Commission). Specific emphasis was given to energy-efficient and circular economy solutions, but also to indicators to monitor the impact and assess the improvements made by the sector.

In December 2020, the ENG organised with the Chair's team a virtual workshop for the attention of the NRA Heads. It provided an occasion for the Heads to build on the knowledge that BEREC had gained during the first webinar and to share their experience and ambitions on the topic they consider to be one of the key horizontal priorities for 2021.

In addition, the ENG procured an external study to provide input to assist NRAs in positioning themselves on this wide-ranging subject. The study was launched in late December 2020 and will end in autumn 2021. The study must provide BEREC and NRAs with key information about the environmental impact of the digital sector, and the electronic communication sector in particular. It may become a decision support tool for NRAs in the field of sustainability.

In December 2020, the Board of Regulators agreed at their 45th plenary to widen the scope of the ENG's activities and established an ad hoc WG on sustainability. This ad hoc WG took over the external tasks (external study, report on sustainability) from the ENG, which will focus on sustainability objectives within the BEREC Office in 2021.

2.8 Possible BEREC work for 2021 and beyond

In preparing its new strategy, BEREC considered the strategic value and options for adopting a longer-term strategic outlook with regard to its work programmes. Given the amount of work for BEREC for 2019-2020 following the introduction of the EECC, it had not been possible to initiate a number of important proposals before 2021. In order not to lose track of such potential workstreams, BEREC committed to maintaining a repository of workstreams that it could focus on at a later date. This repository will be reviewed and updated as appropriate; however BEREC cannot commit to the exact scope of any of the proposals should they be included in work carried out in future years.

Some of the topics proposed included the following:

- Economic assessment of the cost of rolling out 5G in the EU
- Satcom solutions for 5G
- Emergency calling and Next Generation 112
- Comparison of tools for comparing telecoms services
- Non-discrimination with regard to QoS
- Wholesale replicability test
- Compensation in the case of early termination of contracts
- Internet Value Chain
- A consistent approach to migration & copper switch off
- Report on key elements for the functioning of the EECC
- Exchange on the impact of the Public Sector Information Directive
- Workshop on NRA experiences with 5G
- IP peering workshop

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

A. Meetings with the European Commission

Dates/place	Event
29 January 2020, Brussels, Belgium	Meeting between European Commission and BEREC Chair 2020
19 February 2020, Brussels	Meeting between European Commission and BEREC Chair 2020
26 June 2020, Virtual meeting	Meeting between European Commission, US Department of State and BEREC Chair 2020
30 June 2020, Virtual meeting	Meeting between European Commission – Internal Audit Service and BEREC Chair 2020

B. Meetings with the European Parliament

Dates/place	Event
30 January 2020, Brussels	Bilateral meeting between BEREC Vice Chair Michel Van Bellinghen (BIPT) on behalf of the BEREC Chair with the MEP Dita Charanzova, Vice-President of the European Parliament
6 February 2020, Brussels	Bilateral meeting between BEREC Vice Chair Michel Van Bellinghen (BIPT) on behalf of the BEREC Chair with the MEP Alex Agius Saliba, Committee on Internal Market and Consumer Protection, Digital Service Act Rapporteur

C. Meetings and workshops with other EU bodies

Dates/place	Event
19 February 2020, Brussels	European Investment Bank – Roundtable Workshop
12 May 2020, Virtual meeting	European Regulators Group for Audiovisual Media Services
23 June 2020, Virtual meeting	Bilateral meeting with European Data Protection Board

Annex 2 Public debriefings and BEREC engagement with stakeholders

Dates/place	Event
10 March 2020, Virtual meeting	Public debriefing on the outcomes of the 42nd BEREC Ordinary meetings
17 March 2020, Virtual meeting	Virtual meeting with stakeholders on the draft BEREC Guidelines on Very High Capacity Networks
12 May 2020, Virtual meeting	Regulation in Times of Pandemic and Lessons for the Future: A European view
16 June 2020, Virtual meeting	Public debriefing on outcomes of the 43rd BEREC ordinary meetings
23 June 2020, Virtual meeting	Virtual meeting sessions on the draft BEREC Guidelines on criteria for a consistent application of Article 61(3) EECC
30 June 2020, Virtual meeting	BEREC–OECD Webinar on Quality of Services and Quality of Experience
6 October 2020, Virtual meeting	Public debriefing on the outcomes of the 44th BEREC Ordinary meetings
19 October 2020, Virtual meeting	8th BEREC Stakeholder Forum
15 December 2020, Virtual meeting	Public debriefing on the outcomes of the 45th BEREC Ordinary meetings
21 December 2020, Virtual meeting	Joint ENISA-BEREC Workshop on 5G cybersecurity toolbox developments and way(s) forward

Annex 3 International events

Dates/place	Event
21-24 January 2020, San Francisco, USA	Organisations including Apple, AT&T, Cisco, Facebook, Google, ICANN, Microsoft, SpaceX, and Qualcomm
29 January 2020, Brussels, Belgium	Permanent Representation of Sweden to the EU European 5G Conference 2020
4 February 2020, Brussels, Belgium	GSMA Roundtable
20 February 2020, Ankara, Turkey	Conference: Net Neutrality, Turkey, and Beyond
10 March 2020, Brussels, Belgium	European Competitive Telecommunications Association & Centre for European Policy Studies Association Conference/Roundtable: Towards a single market in European telecoms
21 April 2020, Virtual meetings	Facebook Roundtable: The World Bank, WEF, GSMA and ITU mobilized in the fight against COVID-19
28-29 April 2020, Virtual meeting	Forum Europe on Spectrum, Connectivity and COVID-19
26 May 2020, Virtual meetings	Bilateral meeting with the International Institute of Communications (IIC) ITU Regional Development Forum for Europe

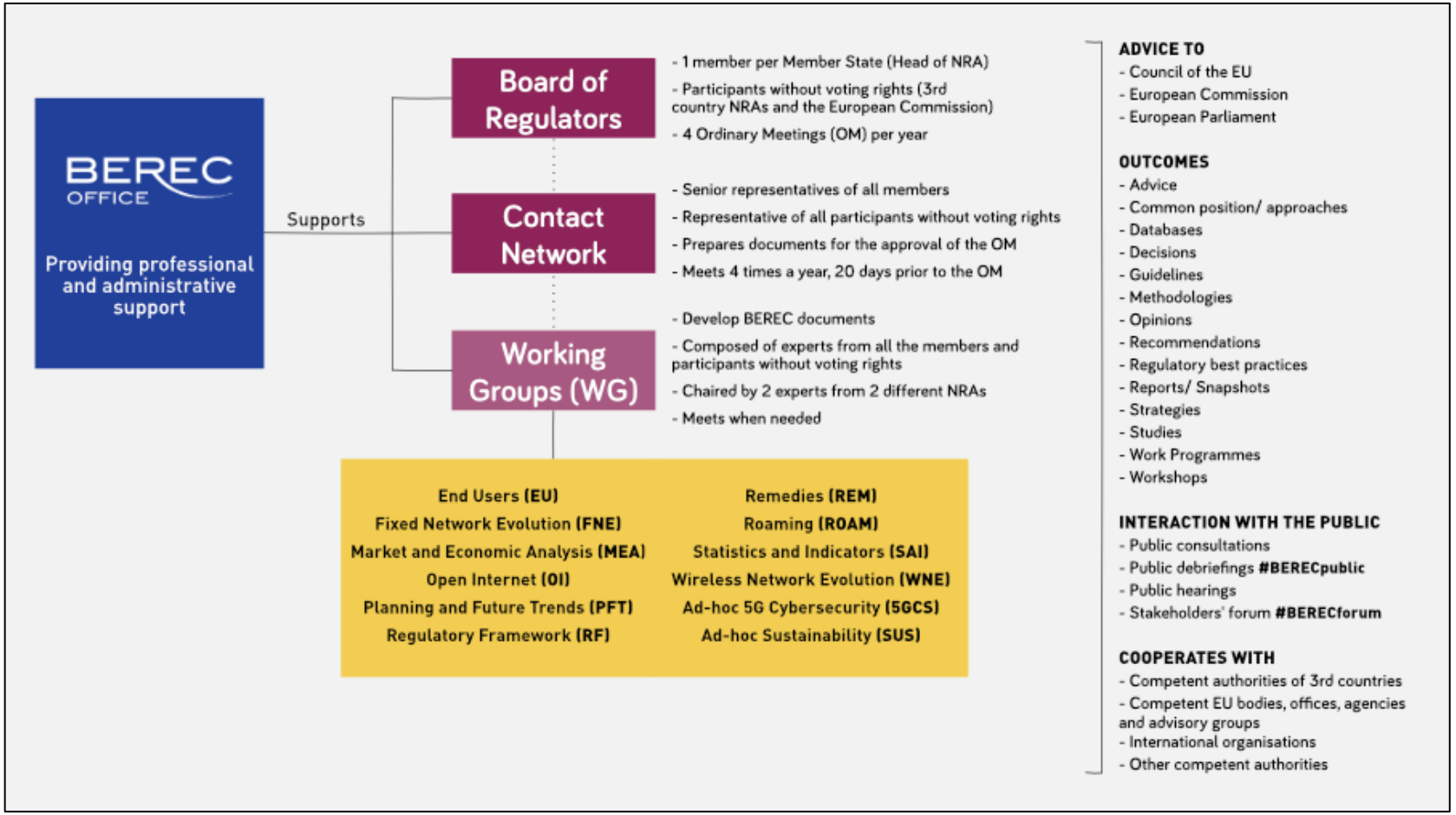
Dates/place	Event
28 May 2020, Virtual meetings	Forum Europe - Unlocking the Benefits of the Full-Fibre Gigabit Society Interview – Politico
22 June 2020, Virtual meetings	Ericsson conference: Broadband for All
29 June 2020, Virtual meetings	European Spectrum Management Conference
30 June 2020, Virtual meetings	ITU – Global Symposium for Regulators
2 July 2020, Virtual meetings	ITU - Regional Seminar for Europe and CIS on Spectrum Management and Broadcasting
14 September 2020, Virtual meeting	France Stratégie: International workshop, Ultra-Fast Broadband in Europe: State of play and trends
23 September 2020, Virtual meeting	Caribbean Regulatory Forum
5-6 October 2020, Virtual meeting	IIC International Regulators' Forum
7 October 2020, Virtual meetings	EaPeReg EU4Digital Second annual Steering Committee Meeting GSMA Asia Pacific 5G Leaders CxO Forum

Dates/place	Event
22-23 October 2020, Virtual meeting	ITU Regional Forum for Europe on 5G Strategies, policies and implementation
5 November 2020, Virtual meeting	Observatorio Nacional 5G, initiative of Mobile World Capital, the Secretary of State of Telecommunications and Digital Infrastructure
11 November 2020, Virtual meetings	Osiptel - International Seminar, The role of telecommunications towards an Ecosystem and Digital Economy Regulatory strategies and policy towards the Digital Economy in a post COVID-19 environment Regulatel seminar - The role of telecommunications towards an Ecosystem and Digital Economy
12 November 2020, Virtual meetings	5G Techritory, the 3rd annual Baltic Sea Region 5G Ecosystem Forum
13 November 2020, Virtual meetings	Fifth Panel on Harmonisation of Digital Markets (HDM) in the Eastern Partnership
1 December 2020, Virtual meeting	ITU Regional Development Forum for Europe
3 December 2020, Virtual meeting	EaPeReg chairmanship 2021 Plenary meeting

Annex 4 Meetings between the BEREC Chair, Vice-Chairs and Chairs of BEREC Working Groups

Dates/place	Event
14 January 2020, Riga, Latvia	Visit of the BEREC Chair 2020 (PTS) to the BEREC Office
11 February 2020, Virtual meeting	Meeting between the BEREC Chair and Vice-Chairs
13-14 February 2020, Virtual meeting	WG Co-Chairs meeting
4 March 2020, Belgrade, Serbia	Meeting between the BEREC Chair and Vice-Chairs
12 March – 10 June 2020, Virtual meetings	Multiple meetings between the BEREC Chair and Vice-Chairs
18 June 2020, Virtual meeting	WG Co-Chairs meeting
7 July – 8 December 2020, Virtual meetings	Multiple meetings between the BEREC Chair and Vice-Chairs

Annex 5 BEREC and BEREC Office organisational structure



The work of BEREC is organised into Working Groups (WGs), which work on specific topics that are included in the BEREC Work Programme or that arise on an ad hoc basis, following requests for advice or opinions from the EU Institutions. The WGs are led by two Co-Chairs from different NRAs and include their respective experts.

Annex 6 Plenary meetings of the Board of Regulators (BoR)

Dates/place	Event	Agenda and Conclusions
5-6 March 2020, Belgrade, Serbia	42nd BEREC ordinary meetings	42nd Plenary
11-12 June 2020, Virtual meeting	43rd BEREC ordinary meetings	43rd Plenary
15 July 2020, Virtual meeting	BEREC Extraordinary Plenary meeting	Extraordinary Plenary
30 September – 2 October 2020, Virtual meeting	44th BEREC ordinary meetings	44th Plenary
10-11 December 2020, Virtual meeting	45th BEREC ordinary meetings	45th Plenary

Annex 7 Meetings of the Contact Network (CN) established prior to the Board of Regulators (BoR)

Dates/place	Event	Agenda and Conclusions
6-7 February 2020, Tromso, Norway	1st BEREC Contact Network meeting in 2020	CN1
14-15 May 2020, Virtual meeting	2nd BEREC Contact Network meeting in 2020	CN2
26 June 2020, Virtual meeting	Extraordinary BEREC Contact Network meeting	Extraordinary CN
9 July 2020, Virtual meeting	2nd Extraordinary BEREC Contact Network meeting	2nd Extraordinary CN
10-11 September 2020, Virtual meeting	3rd BEREC Contact Network meeting in 2020	CN3
30 September 2020, Virtual meeting	3rd Extraordinary BEREC Contact Network meeting	3rd Extraordinary CN
19-20 November 2020, Virtual meeting	4th BEREC Contact Network Meeting in 2020	CN4

Annex 8 Publicly available documents approved by the Board of Regulators (BoR) in 2020

A. BEREC opinions

Document number	Description	Date
BoR (20) 03	BEREC Opinion on Phase II investigation pursuant to Article 7 of Directive 2002/21/EC as amended by Directive 2009/140/EC: Case SE/2019/2216 Wholesale local access to fibre networks provided at a fixed location in Sweden	10 January 2020
BoR (20) 131	BEREC input on EC request for the preparation of the legislative proposal for the new roaming regulations	30 June 2020
BoR (20) 190	BEREC Opinion on the Draft Delegated Act setting single maximum Union-wide voice fixed and mobile termination rates	15 October 2020
BoR (20) 174	BEREC Opinion on the European Commission's Draft Recommendation on relevant product and service markets susceptible to ex-ante regulation	16 October 2020

B. BEREC reports

Document number	Description	Date
BoR (20) 45	BEREC Report on the outcome of the public consultation on draft BEREC Guidelines on Common Approaches to the Identification of the Network Termination Point in different Network Topologies	5 March 2020
BoR (20) 31	International Roaming BEREC Benchmark Data Report April 2019 – September 2019	5 March 2020
BoR (20) 33	Feasibility study on development of coverage information for 5G deployments	5 March 2020

Document number	Description	Date
BoR (20) 32	BEREC Report on the outcome of the public consultation on the draft BEREC Feasibility study on development of coverage information for 5G deployments	5 March 2020
BoR (20) 52	BEREC Report on the outcome of the public consultation on the Guidelines detailing Quality of Service Parameters	6 March 2020
BoR (20) 82	BEREC Summary Report on the status of internet capacity in light of the Covid-19 crisis (first of multiple iterations through 2020)	25 March 2020
BoR (20) 99	BEREC Report on Member States' best practices to support the defining of adequate broadband Internet Access Service (IAS)	11 June 2020
BoR (20) 97	Termination rates at the European level January 2020	11 June 2020
BoR (20) 110	Draft BEREC Report on the impact of 5G on regulation and the role of regulation in enabling the 5G ecosystem	11 June 2020
BoR (20) 100	Report on BEREC International Mission to the USA	11 June 2020
BoR (20) 111	BEREC Report on the outcome of the public consultation on draft BEREC Guidelines on the Implementation of the Open Internet Regulation	11 June 2020
BoR (20) 116	BEREC Report on WACC parameter calculations according to the European Commission's WACC Notice	12 June 2020
BoR (20) 114	BEREC Report on the outcome of the public consultation on the draft BEREC guidelines on how to assess the effectiveness of public warning systems transmitted by different means	12 June 2020

Document number	Description	Date
BoR (20) 167	BEREC Internal Report in the preparation of 'The Workshop on a harmonized data collection regarding OTT services'	1 October 2020
BoR (20) 157	International Roaming BEREC Benchmark Data Report October 2019 - March 2020 & 2nd Western Balkan Roaming Report	1 October 2020
BoR (20) 156	Intra EU Communications BEREC Benchmark Data Report April 2019 – March 2020	1 October 2020
BoR (20) 166	BEREC Report on the implementation of Regulation (EU) 2015/2120 and BEREC Net Neutrality Guidelines	1 October 2020
BoR (20) 158	Summary report on the joint OECD and BEREC's Webinars on Improving customer experience of electronic communication services through QoS and QoE	1 October 2020
BoR (20) 154	BEREC Report on the outcome of the public consultation on the updated BEREC Guidelines on Intra-EU communications	01 October 2020
BoR (20) 234	Overview of the Member States experiences related to the regulatory and other measures in light of the COVID-19 crisis	30 November 2020
BoR (20) 170	BEREC Report on Penalties	8 December 2020
BoR (20) 227	Internal Report concerning the EU 5G Cybersecurity Toolbox Strategic Measures 5 and 6 (Diversification of suppliers and strengthening national resilience)	10 December 2020
BoR (20) 208	BEREC Report on Transparency and Comparability of International Roaming Tariffs	10 December 2020

Document number	Description	Date
BoR (20) 209	Termination rates at European level July 2020	10 December 2020
BoR (20) 210	BEREC Report on Regulatory Accounting in Practice 2020	10 December 2020
BoR (20) 228	Report of BEREC recent activities concerning the EU 5G Cybersecurity Toolbox Strategic Measures 5 and 6 (Diversification of suppliers and strengthening national resilience)	10 December 2020
BoR (20) 231	BEREC Report on the outcome of the public consultation on the Draft BEREC Guidelines to foster the consistent application of the conditions and criteria for assessing co-investments in new very high capacity network elements (Article 76 (1) and Annex IV EECC)	11 December 2020
BoR (20) 240	Summary Report on the Outcomes of Mobile Infrastructure Sharing Workshop	18 December 2020

C. BEREC public consultations

Document number	Description	Date
BoR (20) 61	Notice for the launch of the public consultation on the BEREC Strategy 2021-25 and early call for input on the BEREC WP 2021	10 March 2020
BoR (20) 106	Draft BEREC Guidelines on the Criteria for a Consistent Application of Article 61(3) EECC	11 June 2020
BoR (20) 113	Draft BEREC Guidelines to foster the consistent application of the criteria for assessing co-investments in new very high capacity network elements (Article 76 EECC)	12 June 2020
BoR (20) 126	Notice for the launch of the public consultation on the draft BEREC Guide to the BEREC 5G Radar and 5G Radar	16 June 2020
BoR (20) 184	Notice for the launch of the public consultation on the BEREC Work Programme 2021	6 October 2020
BoR (20) 183	Notice for the launch of the public consultation on Draft BEREC guidelines to assist NRAs on the consistent application of geographical surveys of network deployments	6 October 2020
BoR (20) 245	Notice for the launch of the public consultation on Draft BEREC guidelines on geographical surveys. Verification of information.	15 December 2020

D. Annual work programme and annual reports

Document number	Description	Date
BoR (20) 09	Outline for BEREC Work Programme 2021	30 January 2020

Document number	Description	Date
BoR (20) 108	BEREC Strategy 2021-2025	11 June 2020
BoR (20) 96	BEREC Annual Reports for 2019	11 June 2020
BoR (20) 220	BEREC Work Programme 2021	10 December 2020

E. Regulatory best practices

Document number	Description	Date
BoR (20) 46	BEREC Guidelines on Common Approaches to the Identification of the Network Termination Point in different Network Topologies	5 March 2020
BoR (20) 53	BEREC Guidelines detailing Quality of Service Parameters	6 March 2020
BoR (20) 50	BEREC guidelines on common criteria for the assessment of the ability to manage numbering resources by undertakings other than providers of electronic communications networks or services and of the risk of exhaustion of numbering resources if numbers are assigned to such undertakings	6 March 2020
BoR (20) 115	BEREC Guidelines on how to assess the effectiveness of public warning systems transmitted by different means	12 June 2020
BoR (20) 155	Updated BEREC Guidelines on Intra-EU communications	1 October 2020
BoR (20) 165	BEREC Guidelines on Very High Capacity Networks	1 October 2020
BoR (20) 225	BEREC Guidelines on the Criteria for a Consistent Application of Article 61 (3) EECC	10 December 2020
BoR (20) 232	BEREC Guidelines to foster the consistent application of the conditions and criteria for assessing new very high capacity network elements (Article 76 (1) and Annex IV EECC)	11 December 2020

F. Other documents

Document number	Description	Date
BoR (20) 51	BEREC response to EC Consultation Questions on the Procedural Recommendation for Internal Market Procedures under the European Electronic Communications Code	6 March 2020
BoR (20) 66	Joint Statement from the Commission and the Body of European Regulators for Electronic Communications (BEREC) on coping with the increased demand for network connectivity due to the Covid-19 pandemic	19 March 2020
BoR (20) 84	BEREC response to EC recommendation on Covid-19 tracing apps	22 April 2020
BoR (20) 94	Letter to the European Commission on BEREC concerns of violation of NRA independence in Poland	25 May 2020
BoR (20) 141	New BEREC Statement on the independence of National Regulatory Authorities	7 August 2020
BoR (20) 138	BEREC Response to the Public Consultations on the Digital Services Act Package and the New Competition Tool	7 September 2020
BoR (20) 169	BEREC Response to the Targeted consultation on the revision of the Commission's access recommendations	2 October 2020
BoR (20) 235	Memorandum of Understanding between the Body of European Regulators for Electronic Communications (BEREC) and the Telecom Regulatory Authority of India (TRAI)	4 December 2020
BoR (20) 212	List/Snapshot on Premium rate numbers	10 December 2020

Document number	Description	Date
BoR (20) 223	Guide to the BEREC 5G Radar and 5G Radar	10 December 2020
BoR (20) 226	BEREC response on the targeted public consultation on the evaluation of the state aid rules for the deployment of broadband networks	10 December 2020

Annex 9 Board of Regulators electronic voting procedures

No.	Subject	Comments round Date/link to documents	Voting round Date/link to documents
1.	Art. 7 Phase II case SE/2019/2216	2 January 2020	10 January 2020
2.	Outline BEREC Work Programme 2021	20 January 2020	28 January 2020
3.	Decision of the BoR on the appointment of the Fixed Network Evolution (FNE) Working Group Co-Chair	23 January 2020	28 January 2020
4.	Decision of the BoR on the appointment of the Wireless Network Evolution (WNE) Working Group Co-Chair	13 March 2020	17 March 2020
5.	Joint Statement from of DG CONNECT and BEREC on coping with the increased demand for network connectivity due to the Covid-19 pandemic.	19 March 2020	19 March 2020
6.	Draft BEREC input to the EC on Roaming	23 June 2020	29 June 2020
7.	Draft BEREC statement on the independence of the national regulatory authorities	24 July 2020	3 August 2020

No.	Subject	Comments round Date/link to documents	Voting round Date/link to documents
8.	Draft BEREC response to DSA	27 August 2020	4 September 2020
9.	Draft RSPG / BEREC joint position paper on EMF	22 September 2020	30 September 2020
10.	Draft BEREC input on weighted average of maximum mobile termination rates	6 October 2020	13 October 2020
11.	Draft BEREC Opinion on the Draft Delegated Act setting single maximum Union-wide voice fixed and mobile termination rates	8 October 2020	14 October 2020
12.	Draft BEREC Opinion on the European Commission's Draft Recommendation on relevant product and service markets susceptible to ex-ante regulation	8 October 2020	14 October 2020
13.	Draft BEREC External Report on Penalties	23 November 2020	1 December 2020
14.	Draft BEREC Decision to establish a MoU between TRAI and BEREC	1 December 2020	3 December 2020

No.	Subject	Comments round Date/link to documents	Voting round Date/link to documents
15.	Draft BEREC Summary report on Workshop on Mobile Infrastructure Sharing	8 December 2020	16 December 2020
16.	Draft Decision to establish a MoU between EMERG and BEREC	10 December 2020	15 December 2020

Annex 10 BEREC Members and Observers of the Board of Regulators by end 2020

L I S T

List of the members and observers of the Board of Regulators established pursuant to Article 7(1) 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)

No	Country (if applicable)	Title	Name(s)	Surname(s)	Name of organisation	Member or observer
1.	Albania	Mr	Tomi	**Frasheri**	Electronic and Postal Communications Authority of Albania, AKEP	Observer
2.	Austria	Mr	Klaus	**Steinmaurer**	Austrian Regulatory Authority for Broadcasting and Telecommunications (RTR-GmbH)	Member
3.	Belgium	Mr	Michel	**Van Bellinghen**	Institut Belge des Postes et Télécommunications (IBPT / BIPT)	Member
4.	Bulgaria	Mr	Ivan	**Dimitrov**	Communications Regulation Commission (CRC)	Member
5.	Croatia	Mr	Tonko	**Obuljen**	Croatian Regulatory Authority for Network Industries (HAKOM)	Member
6.	Cyprus	Mr	George	**Michaelides**	Office of the Commissioner of Telecommunications and Postal Regulation (OCECPR)	Member
7.	Czechia	Ms	Hana	**Továrková**	Czech Telecommunication Office (CTU)	Member
8.	Denmark	Mrs	Katrine	**Windning**	Danish Business Authority (DBA)	Member
9.	Estonia	Mr	Kaur	**Kajak**	Estonian Technical Regulatory Authority (ETRA)	Member

No	Country (if applicable)	Title	Name(s)	Surname(s)	Name of organisation	Member or observer
10.	Finland	Ms	Kirsi	**Karlamaa**	Finnish Communications Regulatory Authority (FICORA)	Member
11.	North Macedonia	Mr	Sasho	**Dimitrijoski**	Agency for Electronic Communications (AEC)	Observer
12.	France	Mr	Sébastien	**Soriano**	Autorité de régulation des communications électroniques, des postes et de la distribution de la presse (ARCEP)	Member
13.	Germany	Mr	Wilhelm	**Eschweiler**	Federal Network Agency (BNetzA)	Member
14.	Greece	Mr	Konstantinos	**Masselos**	Hellenic Telecommunications and Post Commission (EETT)	Member
15.	Hungary	Mrs	Monika	**Karas**	National Media and Infocommunications Authority (NMHH)	Member
16.	Iceland	Mr	Hrafnkell	**Gislason**	Post and Telecom Administration (PTA)	Observer
17.	Ireland	Mr	Jeremy	**Godfrey**	Commission for Communications Regulation (COMREG)	Member
18.	Italy	Mr	Giacomo	**Lasorella**	Autorità per le Garanzie nelle Comunicazioni (AGCOM)	Member
19.	Kosovo	Mr	Ilir	**Imeri**	Regulatory Authority of Electronic and Postal Communications (ARKEP)	Observer
20.	Latvia	Mr	Rolands	**Irklis**	Public Utilities Commission (SPRK)	Member
21.	Liechtenstein	Mr	Rainer	**Schnepfleitner**	Office for Communications / Amt	Observer

No	Country (if applicable)	Title	Name(s)	Surname(s)	Name of organisation	Member or observer
					für Kommunikation (AK)	
22.	Lithuania	Mr	Feliksas	**Dobrovolskis**	Communications Regulatory Authority (RRT)	Member
23.	Luxembourg	Mr	Luc	**Tapella**	Institut Luxembourgeois de Régulation (ILR)	Member
24.	Malta	Mr	Jesmond	**Bugeja**	Malta Communications Authority (MCA)	Member
25.	Montenegro	Mr	Darko	**Grgurovic**	Montenegro Agency for Electronic Communications and Postal Services (EKIP)	Observer
26.	Norway	Mr	Hans Jorgen	**Enger**	Norwegian Communications Authority Nkom	Observer
27.	Poland	Mr	Karol	**Krzywicki**	Office of Electronic Communications (UKE)	Member
28.	Portugal	Mr	Joao Antonio	**Cadete de Matos**	Autoridade Nacional de Comunicações (ANACOM)	Member
29.	Romania	Mr	Vlad	**Stoica**	National Authority for Management and Regulation in Communications (ANCOM)	Member
30.	Serbia	Mr	Dragan	**Pejovic**	Regulatory Agency for Electronic Communications and Postal Services (RATEL)	Observer
31.	Slovak Republic	Mr	Ivan	**Martak**	Regulatory Authority for Electronic Communications and Postal Services (RÚ)	Member
32.	Slovenia	Mrs	Tanja	**Muha**	Agency for Communication Networks and Services	Member

No	Country (if applicable)	Title	Name(s)	Surname(s)	Name of organisation	Member or observer
					of the Republic of Slovenia (AKOS)	
33.	Spain	Ms	Alejandra	**Iturriaga de Gandini**	Comisión Nacional de los Mercados y la Competencia **(**CNMC)	Member
34.	Sweden	Mr	Dan	**Sjöblom**	National Post and Telecommunications Agency (PTS)	Member
35.	The Netherlands	Mrs	Annemarie	**Sipkes**	Authority for Consumers and Markets (ACM)	Member
36.	Turkey	Mr	Ömer Abdullah	**Karagözoğlu**	Information and Communication Technologies Authority (ICTA)	Observer
37.		Mr	Roberto	**Viola**	European Commission	Observer
38.		Mr	Gunnar Thor	**Pétursson**	European Free Trade Association (EFTA) Surveillance Authority (ESA)	Observer

Riga, 20 October 2020
BEREC Office

Annex 11 List of acronyms

ANO: Alternative Network Operator

ARRPU: Average Retail (mobile) Revenue per User

BCRD: Broadband Cost Reduction Directive

BEREC: Body of European Regulators for Electronic Communications

BEUC: European Consumer Organisation

BoR: Board of Regulators

BU-LRIC: Bottom Up Long Run Incremental Cost

CAPM: Capital Asset Pricing Model

CRTC: Canadian Radio-television and Telecommunication Commission

DESI: Digital Economy and Society Index

DOCSIS: Data Over Cable Service Interface Specification

EaPeReg: Eastern Partnership Electronic Communications Regulators Network

ECS: Electronic Communications Service(s)/Sector

EEA: European Economic Area

EECC: European Electronic Communications Code

EITO: European IT Observatory

EMERG: Euro-Mediterranean Regulators Group

ENISA: European Union Agency for Network and Information Security

ERP: Equity Risk Premium

ERGA: European Regulators Group for Audiovisual Media Services

ERGP: European Regulators Group for Postal Services

EU: European Union

FCC: Federal Communications Commission (United States of America)

FDC: Fully-Distributed Costs

FTR: Fixed Termination Rate

FTTC: Fibre-To-The-Cabinet

FTTH: Fibre-To-The-Home

FTTP: Fibre-To-The-Premises

HICP: Harmonised Index of Consumer Prices

HSPA: high speed packet access

IoT: Internet of Things

ITRE: European Parliamentary Committee on Industry, Research and Energy

ITU: International Telecommunications Union

LLU: Local Loop Unbundling

LRAIC: Long-Run (Average) Incremental Costs

LRIC: Long-Run Incremental Costs

LTE: Long-Term Evolution

L2 WAP - Layer 2 wholesale access product

M&A: Mergers and Acquisitions

MNO: Mobile Network Operator

MoU: Memorandum of Understanding

MTR: Mobile Termination Rate

MVNO: Mobile Virtual Network Operator

NCA: National Competition Authority

NGA: Next Generation Access

NRA: National Regulatory Authority

NTP: Network Termination Point

OCA: Other Competent Authority

OTT: Over The Top (service/operator)

REGULATEL: Latin American Forum of Telecommunications Regulators

RFR: Risk Free Rate

RLAH: Roam Like At Home

RSPG: Radio Spectrum Policy Group

SMP: Significant Market Power

SMS: Short Message Service

TR: Termination Rate

TRAI: Telecom Regulatory Authority of India

ULL: Unbundled Local Loop

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

VHCN: Very High Capacity Network

VULA: Virtual Unbundled Local Access

WACC: Weighted Average Cost of Capital