Body of European Regulators
for Electronic Communications
BEREC

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Foreword by the BEREC Chair 2019

BEREC's activities in 2019 were predominantly focused on meeting its obligations under the European Electronic Communications Code ('the Code'), in which BEREC was entrusted by the co-legislators with developing ten separate sets of guidelines, spanning a broad range of thematic areas.

Outside the Code and following a legislative update to the Roaming Regulations, BEREC was also tasked with developing guidelines on Intra-EU communication. On its own initiative, BEREC also undertook to review its 2016 guidelines on 'Net Neutrality' (Open Internet). Collectively, these tasks reflects the confidence that the co-legislators placed in BEREC to act as an independent, technical body, capable of contributing to the harmonised application of the legislative framework and so provide a level of certainty to industry players, investors and consumers.

The scale and scope of the tasks assigned to BEREC required a revision of BEREC's practices, resulting in longer-term planning and a corresponding move from annual to multi-annual work programming. The benefits of using a longer planning horizon include the potential for earlier stakeholder input, more time for consultations and earlier input by the Board of Regulators so that the potential benefits from a greater level of harmonisation are identified close to the outset of a project.

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, including as input to the Commission's evaluation of the roaming market, the review of Commission's Recommendation on Relevant Markets and on the Commission's implementing act on a contract summary template for consumer contracts.

Although BEREC's main focus was on the tasks assigned to it by the co-legislators, BEREC was nonetheless conscious that it needed to remain informed of developments within the telecoms sector and what can be considered adjacent sectors, which are underpinned by the telecoms sector. With this in mind, BEREC established a new working group (WG), named the Planning and Future Trends (PFT) WG, which is broadly tasked with carrying out 'horizon-scanning' exercises. In 2019/2020, the WG will look at cataloguing regulatory factors that might impact the roll-out of 5G networks, and also factors required to successfully roll out 5G networks which might impact on current regulatory practices.

In the same vein of staying informed, BEREC's Markets and Economics (MEA) WG completed its study on the Data Economy, a sector that would previously have been considered of little relevance to BEREC but in a converging world is becoming more influential on telecoms markets. BEREC is mindful of the priorities of the new European Commission, in particular to introduce a new Digital Services Act package. In this regard, BEREC remains available to provide any relevant support to the co-legislators and EU institutions, where it can draw on its long-standing experience of ex-ante market regulation, overseeing end user protection in technologically complex markets, integrating technological, economic, legal, and user protection perspectives in the design and practice of regulation and co-ordinating the implementation of a common EU legislative approach to take account of both national and pan-European perspectives.

When carrying out its work in 2019, BEREC was markedly aware of its responsibilities to proactively engage with stakeholders, building on steps taken under RTR's chairmanship in 2018. The consequence of this increased engagement was seen in 2019, when BEREC launched 16 public consultations and hosted external workshops on a range of topics, including intra-EU communications, Open Internet, and geographical surveys of network deployments. These practices established a new way of operating, which will be carried forward and expanded on into the future.

2019 demonstrated BEREC's ability to deliver on its commitments, and it will 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. BEREC's capacity is derived from the dedication, knowledge and competence of the working group co-chairs and the many experts drawn from all NRAs, who positively collaborate to strive for the best outcomes. This diversity of expert inputs gives BEREC its strength, and their ongoing contributions, coupled with positive engagement with our stakeholders, will continue to serve BEREC well into the future.

Thank you!

Jeremy Godfrey

BEREC Chair 2019

PART A: Annual Report on developments in the electronic communications sector in 2019

Annual Report on developments in the electronic communications sector in 2019, under 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

This report highlights the key developments and market trends in the electronic communications sector in Europe over the past twelve months, focusing on market dynamics and the development of European Union public policies and regulatory practices. The report presents the perspectives of the Body of European Regulators for Electronic Communications (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.

BEREC's work in 2019 (and indeed this work will continue on into 2020 and beyond) focused predominantly on meeting the obligations tasked to it by the European Electronic Communications Code (EECC), in which BEREC was tasked with developing multiple Guidelines. Beyond the obligatory work, which the co-legislators tasked to BEREC, 2019 also saw BEREC continue to carry out innovative and necessary projects across a wide range of thematic areas. Those projects included a study on the determinants of investment in very high capacity networks, as well as initiating projects on coverage information for 5G deployments and the impact of 5G on regulation, both of which will come to fruition in 2020. 5G has been at the forefront of BEREC's work in recent years and given the importance of the technology, this will continue to be the case in the coming years.

BEREC, in its regular benchmarking reports, across its Working Groups, highlights the key developments and market trends throughout any given year. Regarding the overall 'financial health' of the electronic communications sector in Europe, the most recent revenue data available to BEREC indicates that the sector has experienced a slight reduction between 2015 and 2018. In this context, it is interesting to note that in the twelve months to December 2019, communications prices (according to Eurostat data) for the EU-28 decreased slightly while, during the same period, the overall Harmonised Index of Consumer Prices (HICP) increased.

The 'shape' of the sector continues to evolve and in 2019 consolidation through merger and acquisition activity continued with a number of mergers between fixed operators, although there were also fixed-mobile mergers during the year. Fixed-mobile mergers have typically been motivated by competition in a convergent scenario where telecommunications operators provide bundled and integrated services using their own fixed and mobile infrastructures. During 2019

mergers have primarily been national in scope, implying that a majority of concentrations are aimed at strengthening firms' market position in an individual European national market, rather than extending its footprint to cover additional countries. However, the European markets have also witnessed some of these broader operations, such as Vodafone's acquisition of Liberty Global's cable operations in the Czech Republic, Germany, Hungary and Romania, and the acquisition of Bonnier Broadcasting by Swedish telecoms incumbent Telia.

From a technological perspective, according to data collected for the Broadband Coverage in Europe 2018 study, Next-Generation Access (NGA) coverage in the European Union has increased significantly between 2013 and 2018. In 2013, 61% of European households had what could be considered an NGA connection, while in 2018 83% of European households had such a connection. 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 about 60% coverage to almost 99% during this period. Indeed, in the twelve months to July 2019, mobile broadband penetration rose from 95.7% to 100.2% in July 2019; the first time that this indicator has gone beyond the 100% threshold since such statistics have been collected.

BEREC constantly monitors domestic termination rates (TRs) in Europe and provides an overview report twice a year on fixed termination rates (FTRs) and mobile termination rates (MTRs). Wholesale interconnection rates for mobile telephony services in Europe fell markedly between January 2004 and July 2019: the simple average, Avg (S), fell from 14.08 to 0.88 cents per minute, while the weighted average, Avg (W), fell from 14.47 to 0.78 cents per minute.

Since the beginning of the liberalisation period, when incumbent operators served all the end-users of fixed network services, the termination service has been 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 has 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 two years, a significant reduction in this regulated price has taken place in the EU-28 countries, thanks to the increasing implementation of the Commission Recommendation on TRs. The simple average of the lowest regulated 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-28) stood at 0.21 cents per minute.

Good progress has been made in developing effective regulatory accounting frameworks to meet the needs of NRAs. However, this is a complex and highly technical topic which requires regular maintenance and enhanced implementation of the regulatory accounting framework as competition develops, technology improves and new regulatory challenges emerge. With the Commission's WACC Notice, BEREC will start to calculate certain WACC parameters according to the methodologies laid down in the non-binding Notice to be applied by NRAs.

According to the published Commission's WACC Notice and as agreed at the 38th Ordinary Plenary Meeting of the BoR, BEREC will estimate two of the WACC parameters, namely a country-specific RFR and an EU-wide ERP in the first half of 2020. Currently it is foreseen that the estimation of the three company-related parameters (beta, gearing and cost of debt), based

on the methodology described in the Commission Notice, will also be completed in the first half of 2020.

BEREC also has to report 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 has to assess how closely these elements relate to each other.

The introduction of RLAH services, coupled with the growing demand for data services, has changed the international roaming market. A relevant point is that the RLAH services enabled a substantial increase in international roaming traffic. The minutes generated under RLAH tariffs account for the majority of roaming voice traffic. In total, 88.10% of minutes of roaming calls made and 85.68% of minutes of roaming calls received in Q3 2019 were generated by subscribers of RLAH tariffs. For text messages sent while roaming within EEA countries, RLAH tariffs accounted for 93.43% of the total volume in Q3 2019. Around 89.48% of data roaming traffic in Q3 2019 was based on the RLAH data tariff while roaming.

BEREC data also show clear evidence of seasonal movements. For example, compared with Q3 2018, the data roaming traffic decreased by 14.12% in Q2 2019. To deal with the impact of seasonality, BEREC compared its data with data from the same quarter in the previous year. Increased volumes can be seen in the relationship between Q3 2018 and Q3 2019. Data roaming consumption ranged from 0.19 GB to 1.61 GB per roaming subscriber monthly in Q3 2019 in comparison with a range from 0.09 GB to 1.31 GB in Q3 2018. In comparison with the same quarter (Q3) in the previous year, total retail data traffic in 2019 increased by 43.7% while the total retail traffic for calls made and calls received exhibited marginal increase.

Finally, BEREC needs to consider the impact of rapidly changing markets, new network technologies and the expected policy developments as well as the increasing cross-border nature of digital services. On the policy side, considering the strategic priorities adopted by the European Commission, there are several policy goals for the digital market in the EU that are relevant for BEREC to consider. These include (among others) creating the right framework to allow Europe to make the most of the digital transition, promoting full connectivity by stimulating private investments while reducing the cost of roll-out in very high capacity networks, strengthening the EU's cybersecurity framework and capabilities and develop a coordinated European approach on artificial intelligence, and a strong focus on digital innovation, while ensuring the continued modernisation of key transport systems.

These priorities will guide the work of the EU Commission in 2020-2024. They are also likely to have a strong impact on BEREC's work during this period.

1. Introduction

BEREC's Work Programme 2019 focused particular attention on the mandatory tasks falling to BEREC, which were set out in the European Electronic Communications Code[1] (EECC), as well as to the fundamental priorities set out by BEREC in its Medium-Term Strategy 2018-2020. As 2018 saw the completion of more than two years of negotiations on the EECC, the scope and scale of the BEREC Work Programme 2019 illustrated the level of work that BEREC is committed to in the coming years, which will be crucial to achieving the general objectives in the EECC.

As part of this commitment, BEREC understands the fundamental part that it plays in promoting competition and investment, promoting the internal market, empowering and protecting end-users, and promoting connectivity in Europe, as well as recognising its central role in ensuring regulatory consistency across Europe.

Therefore, BEREC closely monitors and reports on market developments in the electronic communications sector and publishes its annual report on sector developments under 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 2019, paying particular attention to market and regulatory trends, openness of the internet and framework review challenges, as well as international roaming, termination rates and regulatory accounting.

This report presents BEREC's view, which is based on its members' own 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 the determinants of investment in very high capacity networks – a System Dynamics approach

There is an established political consensus in Europe that Very High Capacity Networks (VHCNs) are required to create the 'Gigabit Society' that will drive economic and social growth and the competitive position of the European Union. VHCNs, including Fibre to the Premises (FTTP) and fibre backhaul to mobile base stations to support 5G services, will be needed to meet demand for high speed communications and access to the Internet for video and other data-rich applications.

BEREC commissioned a study titled 'The determinants of investment in very high capacity networks' to consider how new tools and approaches might best represent the complexity of

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[1] Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018

VHCN investment within regulated markets and understand how the underlying structures, path dependences and actions of all stakeholders in this system will influence observed behaviours.

The various factors which were considered relevant to the study included capital costs, finance and co-investment, competition between technologies, wholesale access conditions, pricing and operating costs, demand for VHCN products and services, the potential impact of 5G & wireless services on VHCN rollout and the regulatory levers available to promote investment in VHCN.

The system dynamics approach in the study generates a number of insights, including:

- One size does not fit all. There are a wide range of investment drivers, whose importance depends on specific market characteristics and there is no universal strategy that would promote investment in VHCN in all circumstances.

- Ecosystems are dynamic. This means that changes in capital costs, revenue potential or finance have indirect effects that ripple through the system.

- Regulatory levers have direct and indirect effects. There are multiple drivers with effects on different operators and indirect effects can be amplified and influence investment appetite.

BEREC had initially contemplated following up this study with a second phase which would quantify the various factors in the theoretical model. However, having received the final report, the BEREC Board of Regulators has decided not to extend the study at this time.

3. Market trends

3.1 Economic context

Economic growth in Europe peaked in 2017. Since then, European growth has declined, and global trade and manufacturing have weakened. European economies exhibited moderate growth in 2019, resulting from the strength of domestic drivers.

In this context, the telecom sector has experienced a 0.6% reduction in retail revenues between 2015 and 2018[2], mainly attributable to the 1.2% drop in mobile retail revenues (whilst fixed retail revenues increased by 0.2%).

Figures 1 and 2 below present fixed and mobile retail revenues, respectively, between 2015 and 2018 for 25 European countries. Figure 1 shows that retail revenues in the fixed communications sector remained flat for 4 countries, grew for 13 and declined for 8. According to the Analysys

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[2] Since BEREC does not gather revenue information from NRAs, for the purposes of illustrating broad market trends, BEREC is providing figures and graphs based on data collected by Analysys Mason, the telecoms consultant and research service provider, using its DataHub portal.

Mason data, fixed retail revenues increased substantially in Lithuania, Romania, Croatia and Finland, while in the UK, Bulgaria and Poland they fell by more than 9% in the same period[3].

Figure 1: Fixed telecom sector retail revenues, 2015-2018, and percentage change, 2015-2018
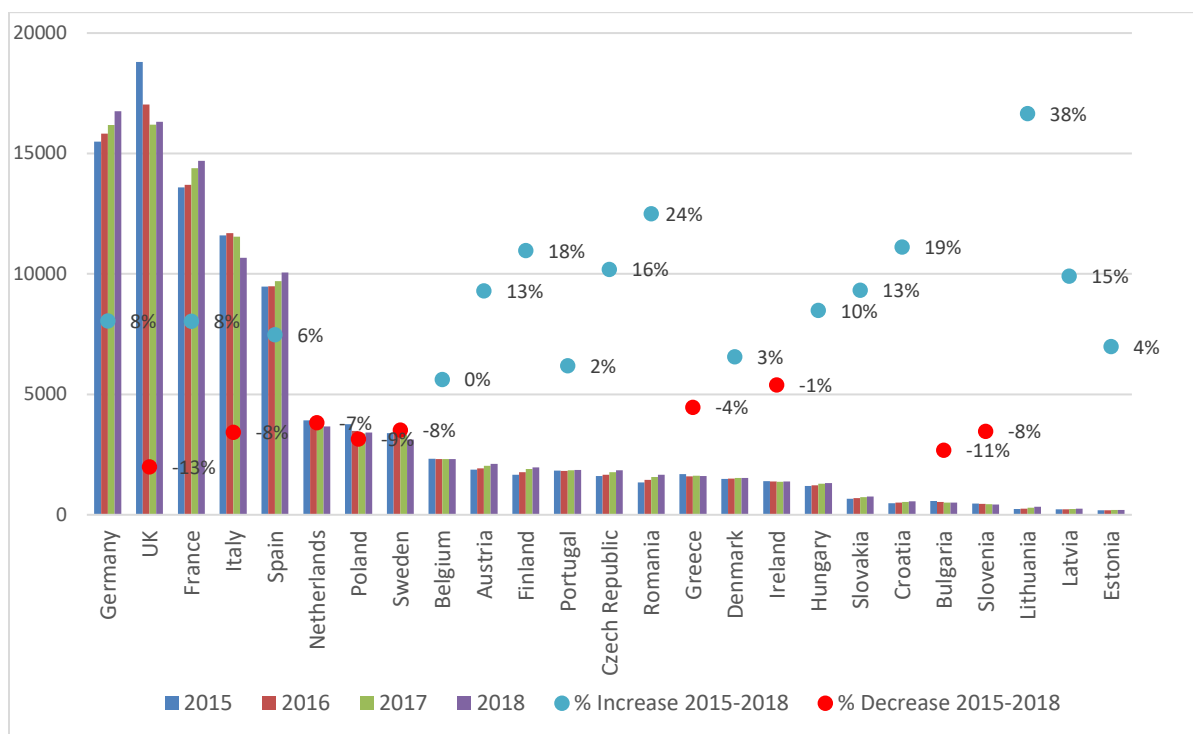
Source: Analysys Mason

Figure 2 shows that retail revenues in the mobile communications sector either remained constant or grew between the end of 2015 and the end of 2018 for 12 of the 25 EU countries analysed. For 8 countries, these revenues fell and in 5 cases the variation was below 3%. According to the Analysys Mason data, mobile retail revenues in Austria and Czech Republic grew by over 15% in the period, while in the UK and Bulgaria they fell by more than 10%.

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[3] Since the sector revenues are provided in euros, they are affected by the evolution of exchange rates. In the case of the UK, the strong decline in GBP/euro exchange during the period results in Euro revenue declines, whilst in GBP fixed and mobile revenues grew by more than 5%.

Figure 2: Mobile telecom sector retail revenues (million euros), 2015-2018, and percentage change, 2015-2018
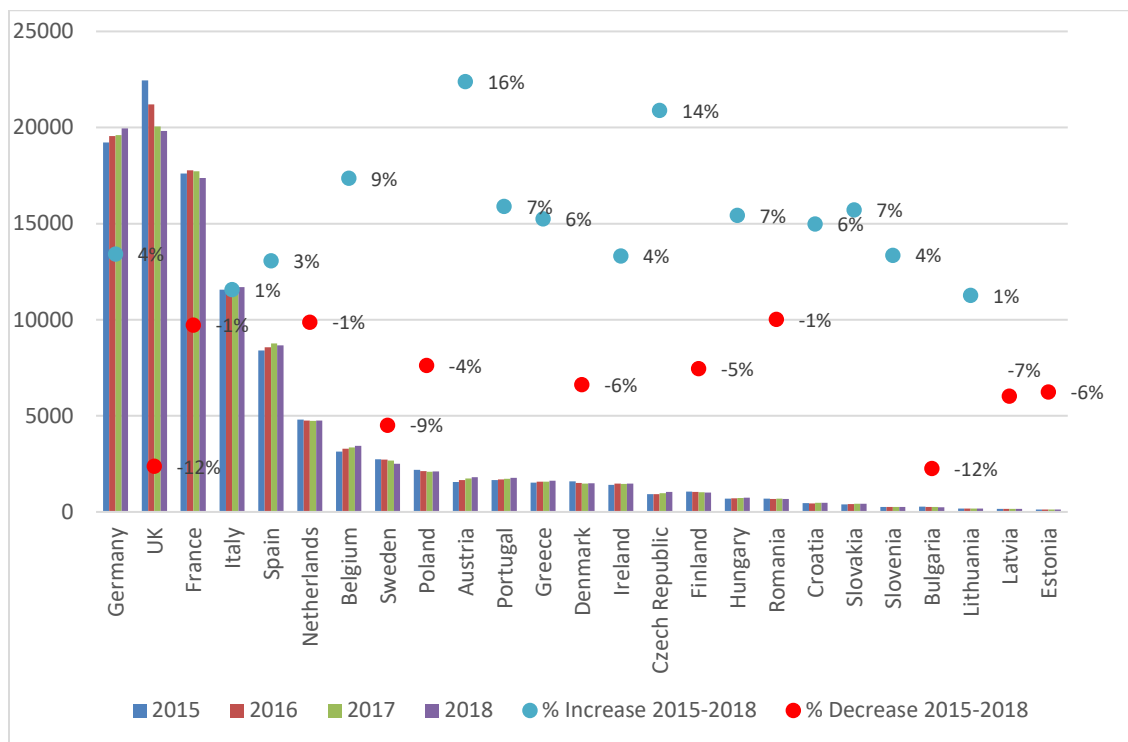
Source: Analysys Mason

Figure 3 below illustrates the change in the overall HICP and the communications sub-component between December 2018 and December 2019. The most notable reductions in communication prices for consumers were experienced in Ireland (-8.8%), Italy (-6.4%) and the Netherlands (-4.4%). In contrast, notable increases in communications prices for consumers were experienced in Romania (+5.4%), the UK (+4.3%) and Poland (+4.3%).

Overall, for the EU-28, according to the Eurostat data, communications prices in the year to December 2019 decreased by 0.2% while the overall HICP actually increased in the same period by 1.6%.

Figure 3: EU-28 percentage change (January-December 2019) in the HICP and the communications sub-component
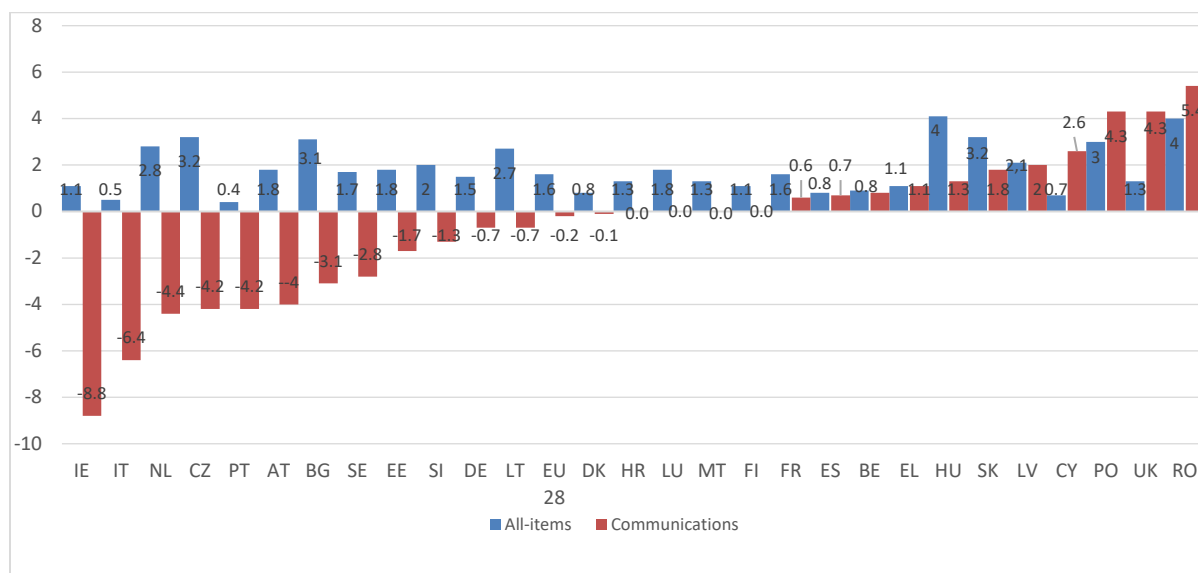
Sources: Eurostat and Offices for National Statistics

3.2 Mergers and acquisitions

Consolidation through mergers and acquisitions (M&A) continued in the European electronic communications services (ECS) markets in 2019. This consolidation process involved mostly fixed or fixed/mobile mergers. The latter are motivated by competition in a convergent scenario where telecommunications operators provide bundled and integrated services using their own fixed and mobile infrastructures.

In most cases, the mergers have been national in scope, implying that a majority of concentrations are aimed at strengthening firms' market position in a European national market, rather than at extending its footprint to cover additional countries.

However, the European markets have also witnessed some of these broader operations, which are not shown in Figure 4, such as Vodafone's acquisition of Liberty Global's cable operations in the Czech Republic, Germany, Hungary and Romania, and the acquisition of Bonnier Broadcasting by Swedish telecoms incumbent Telia.

Depending on the transnational scope of the parties involved in these mergers, some of them were analysed by national competition authorities (this was the case for Slovenia, Belgium and Switzerland) and some by the European Commission (as was the case for Telenor, Vodafone and Telia, for example).

Figure 4 shows that many of the M&A operations in 2017-2019 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.

Figure 4: Mergers and acquisitions in Europe 2012-2019
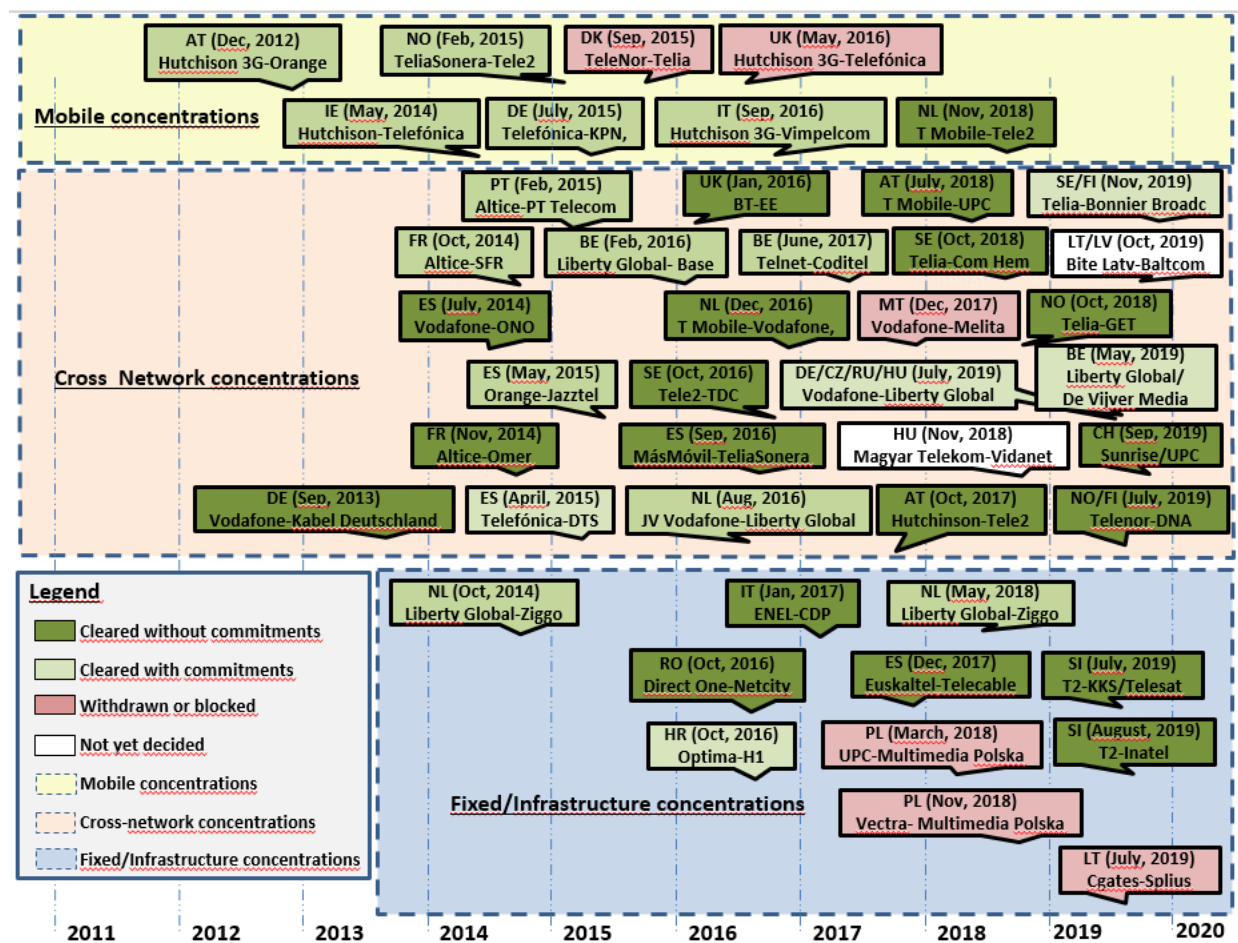
Source: BEREC

The mobile sector went through a period of intense M&A activity in 2010-2015. The parties involved in some of these mergers were mobile network operators (MNOs) within the same country; whereas in other cases, mobile virtual network operators (MVNOs) merged or were acquired by MNOs (not shown in Figure 4). The most interesting M&A activity was where two MNOs merged. As shown in Figure 5, 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).

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

(specifically, the M&As in Austria in 2013, Ireland in 2014, Germany in 2015 and the Netherlands in 2018). The 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 (2012), in Ireland (2014), in the UK (2016) and Italy (2016). The consolidation trend at a national level in the mobile sector in the past years has been reduced and no merger between MNOs was notified or cleared in 2019.

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 or T-Mobile´s 2018 acquisition of UPC Austria); (2) integrated or fixed operators acquiring other integrated operators.

Figure 5: Cross-network consolidation throughout Europe (2017-2019)
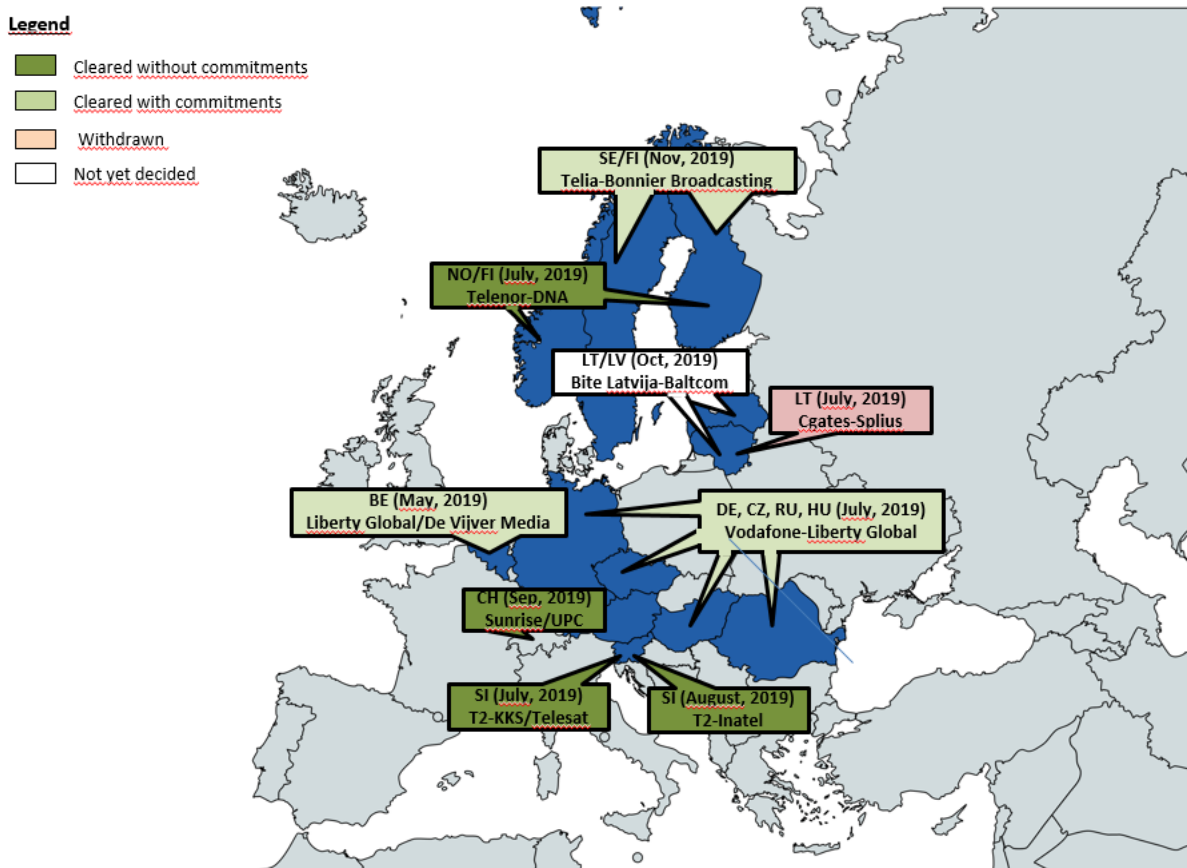
Source: BEREC

In the past, cross-network M&As were in general cleared and many of them without commitments. However, the outcome for the main cross-network concentrations in 2019 varies. The European Commission cleared most of the M&As in 2019. The sole control by the Norwegian incumbent fixed telecoms operator Telenor of Finland's third largest integrated fixed and mobile operator DNA was cleared without commitments by the EC.

In other cases, however, commitments were requested to preserve both competition in the respective national markets and consumer choices. Examples of M&As subject to conditions are Vodafone's acquisition of Liberty Global's cable operations in the Czech Republic, Germany, Hungary and Romania, which was cleared conditional to commitments aimed at preserving competition specifically in Germany, where a nationwide cable network would be (re-)created, and the acquisition of Bonnier Broadcasting by Swedish telecoms incumbent Telia subject to conditions aimed to ensure access to the merged entity's TV channels, streaming services and TV advertising space and to preserve consumer choice in Finland and Sweden.

All the most relevant M&As addressed by National Competition Authorities were cleared, some of them unconditionally. This was the case for Slovenia's leading FTTH network operator T-2's acquisition of three local cable operators (Inatel, KKS Kabel Kamnik and Telesat), as well for the acquisition of the second largest Swiss MNO, Sunrise, of cable operator UPC after an in-depth phase II merger review. One M&A was cleared subject to commitments, namely the acquisition in Belgium of all the remaining shares of Belgian broadcaster De Vijver Media by the fixed and mobile telecoms operator Liberty Global (LG). The remedies offered by Telenet (Liberty Global) include the possibility for competing TV platforms to access DVM's channels, to implement targeted advertising and access usage data on the channels distributed on Telenet's TV platform, as well as channel numbering and distribution fees.

One cross-networks M&A was notified in 2019 and is currently under review. It concerns the Lithuanian[4] telecoms operator's subsidiary Bite Latvija's proposed acquisition of sole control over Latvian telecoms operator and pay TV provider Baltcom. In Lithuania, the second largest fixed operator Cgates finally withdrew its notification of the acquisition of fixed operator Splius after the NCA reached the preliminary conclusion that the merger would substantially restrict competition in a local market.

An interesting cross-sectoral case concerns the merger of energy and telecoms companies SE and Eniig into a new company named Norlys, which was conditionally cleared by the Danish NCA. The NCA's main competition concern was that Norlys would limit or delay the planned opening of Eniig's fibre network to retail competitors, reserving it instead for SE's retail businesses Stofa and Boxer. The parties committed to continuing the planned network opening.

3.3 Broadband and Next-Generation Networks

Total Next-Generation Access (NGA) coverage in the EU increased significantly between 2013 and 2018 from 61% of households to 83%, according to the study on Broadband coverage in

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[4] Bite Latvija is the Latvian subsidiary of Bite Lietuva, a Lithuania-based telecoms operator active in the Baltic countries, which is owned by US-based Providence Equity Partners.

Europe 2018 and its predecessors commissioned by the European Commission (see Figure 6). 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 about 60% coverage to almost 99% during this period. In the period 2013 to 2018, NGA and FTTP coverage increased fairly steadily and on average by 4.4% points (NGA) and 3.1% points (FTTP) per year while the VDSL coverage increase varied between 3.2% points (2015) and 7.2% points (2016) per year.

Figure 6: Development of LTE and NGA coverage in the EU by technology 2013-2018
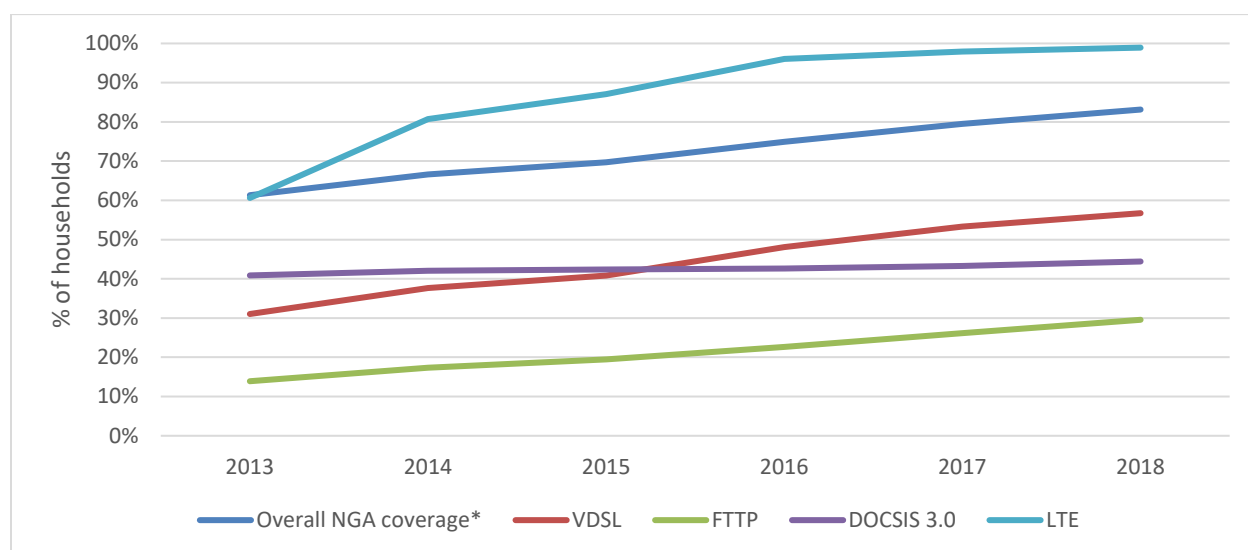
* NGA coverage includes VDSL (very high bitrate digital subscriber line), FTTP (fibre to the premises) and DOCSIS 3.0.
Source: EU Study on Broadband Coverage in Europe 2018[5]

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[5] https://ec.europa.eu/digital-single-market/en/news/study-broadband-coverage-europe-2018

Figure 7: Development of NGA coverage by country 2016-2018
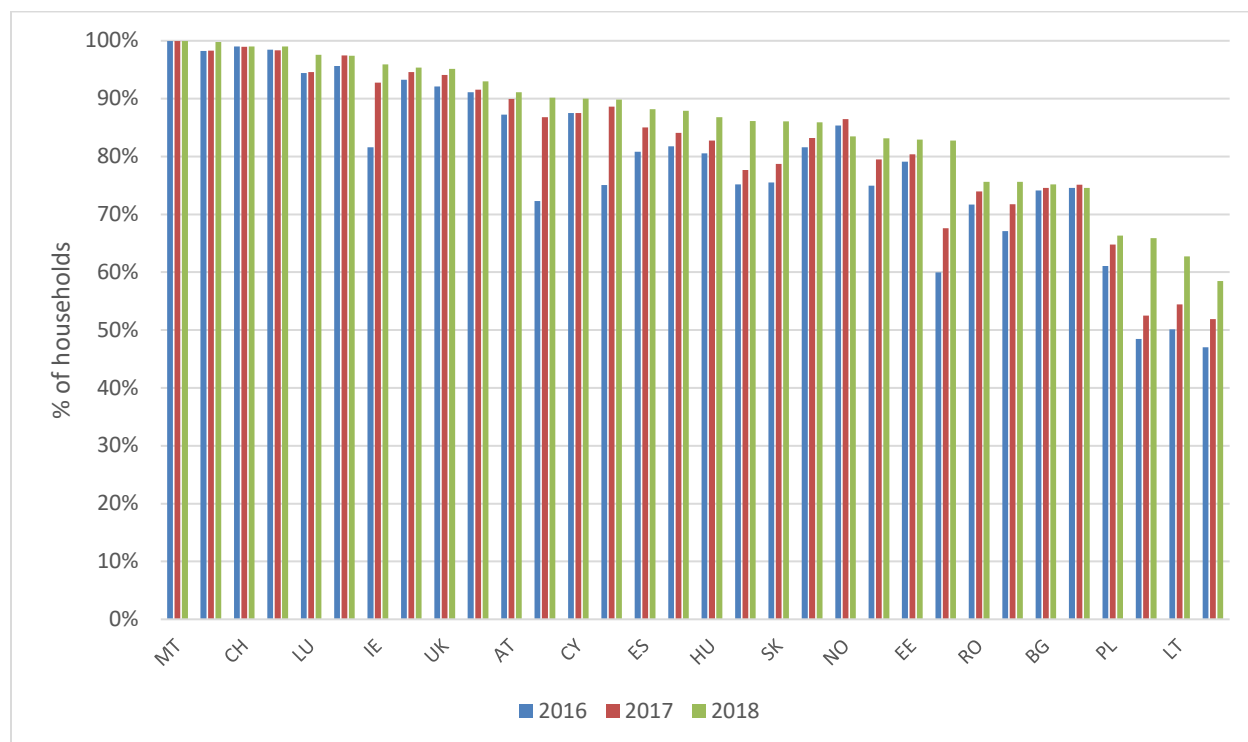
Source: EU Study on Broadband Coverage in Europe 2018[6]

With regard to country level data, Figure 7 shows that there were particularly large increases in NGA coverage in Croatia (23% points), Italy (18% points), Greece (17% points), Czech Republic (15% points) and Ireland (14% points) between 2016 and 2018. 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 Portugal (21% points), France (17% points) and Slovakia (16% points), followed by Malta (16% points) and Spain (15% points).

Coverage with different technologies still varies widely within the EU. Figure 8 shows that the coverage of each of the three main NGA technologies, VDSL, FTTP and DOCSIS 3.0, varies between 0% and 85-100% across the countries listed. With regard to FTTP coverage, Latvia was the leading country in 2018, followed by Spain, Sweden, Portugal and Slovakia.

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[6] https://ec.europa.eu/digital-single-market/en/news/study-broadband-coverage-europe-2018

Figure 8: NGA coverage by technology and country 2018
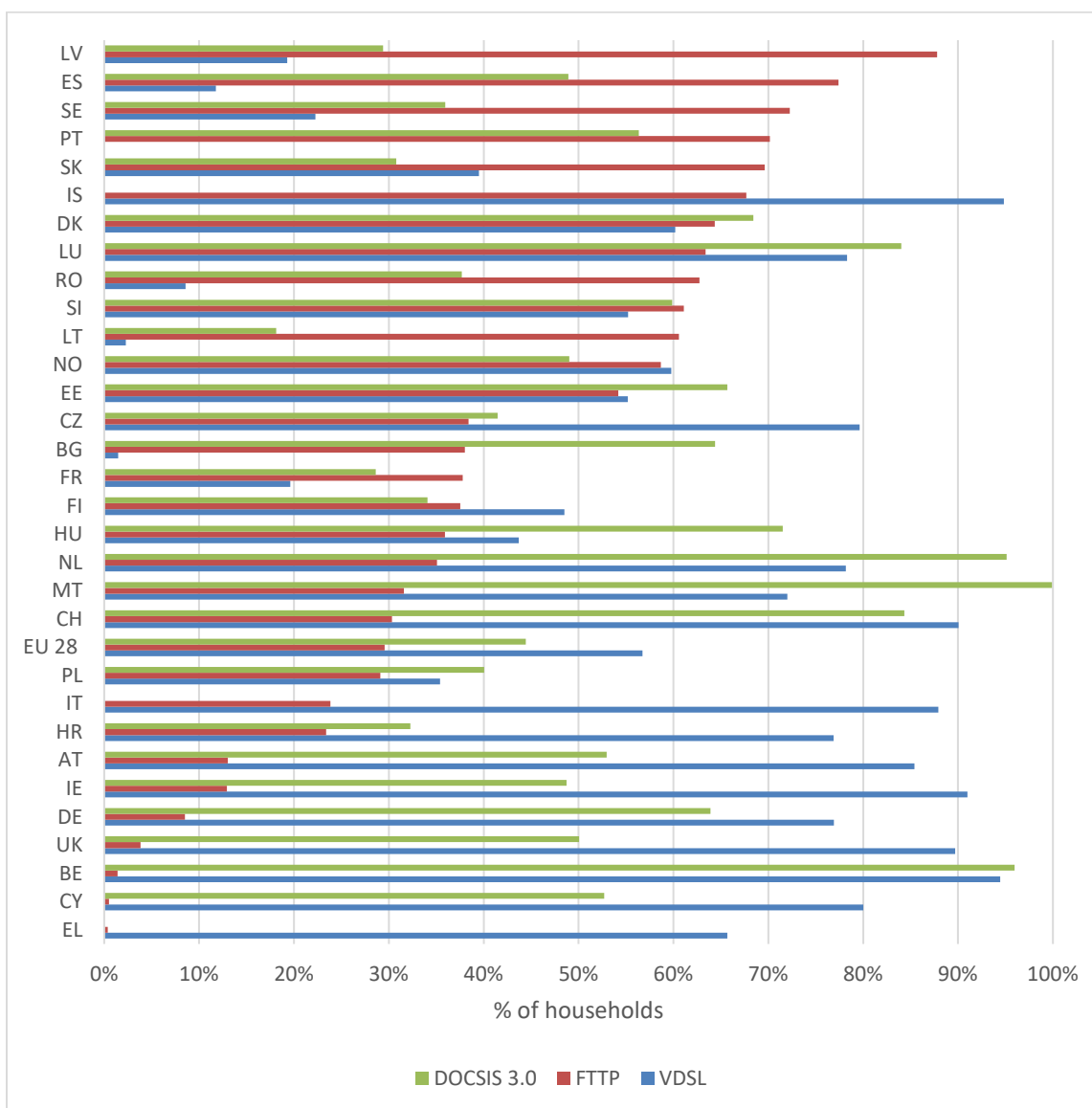
Source: EU Study on Broadband Coverage in Europe 2018[7]

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 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

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[7] https://ec.europa.eu/digital-single-market/en/news/study-broadband-coverage-europe-2018

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 is pursuing a VDSL strategy mainly in countries where no or few ducts are available (which leads 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 9: FTTP versus VDSL coverage 2018
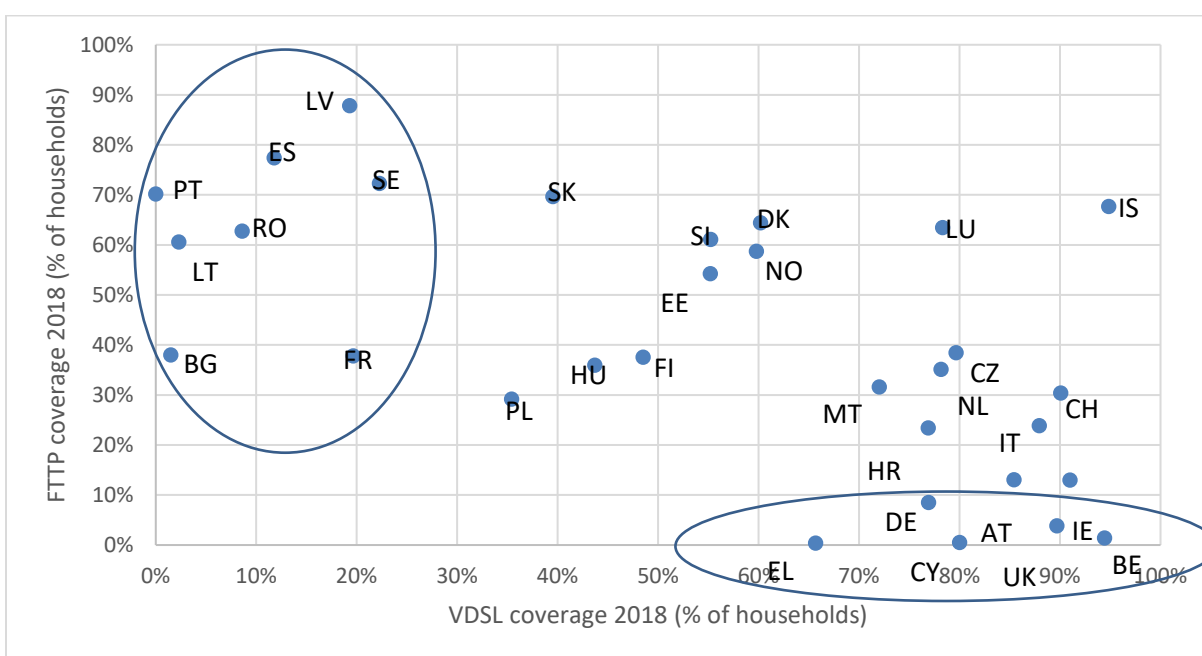
Source: Fig. 8 BoR (16) 171 (updated based on data of the EU Study on Broadband Coverage in Europe 2018)[10]

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[8] An exception here is Sweden, where the high FTTP coverage is mainly driven by demand-side factors.
[9] In UK there is VULA regulation and since 2019 also duct (SMP) regulation.

[10] https://ec.europa.eu/digital-single-market/en/news/study-broadband-coverage-europe-2018

3.4 Mobile broadband

Mobile broadband penetration

Over the past six years, mobile broadband penetration has shown an increasing trend at EU level. It rose notably from 95.7% in July 2018 to 100.2% in July 2019; the first time that this indicator broke the 100% threshold since such statistics have been collected.

Figure 10: Mobile broadband penetration at EU level
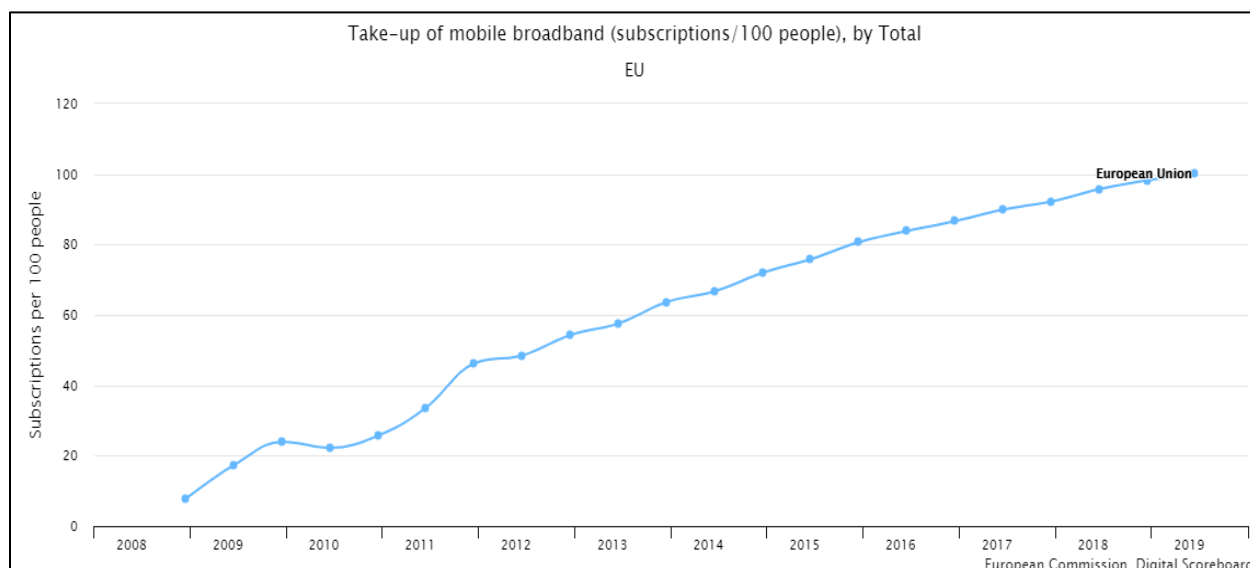
Source: European Commission

In July 2019, mobile broadband penetration, measured in terms of all active users, showed the highest rates in Poland (176%, up from 163% in July 2018), Finland (154%, down from 156% in July 2018), Estonia (152%, up from 144% in July 2018) and Denmark (139%, the same as in July 2018).

Figure 11: Mobile broadband penetration — all active users
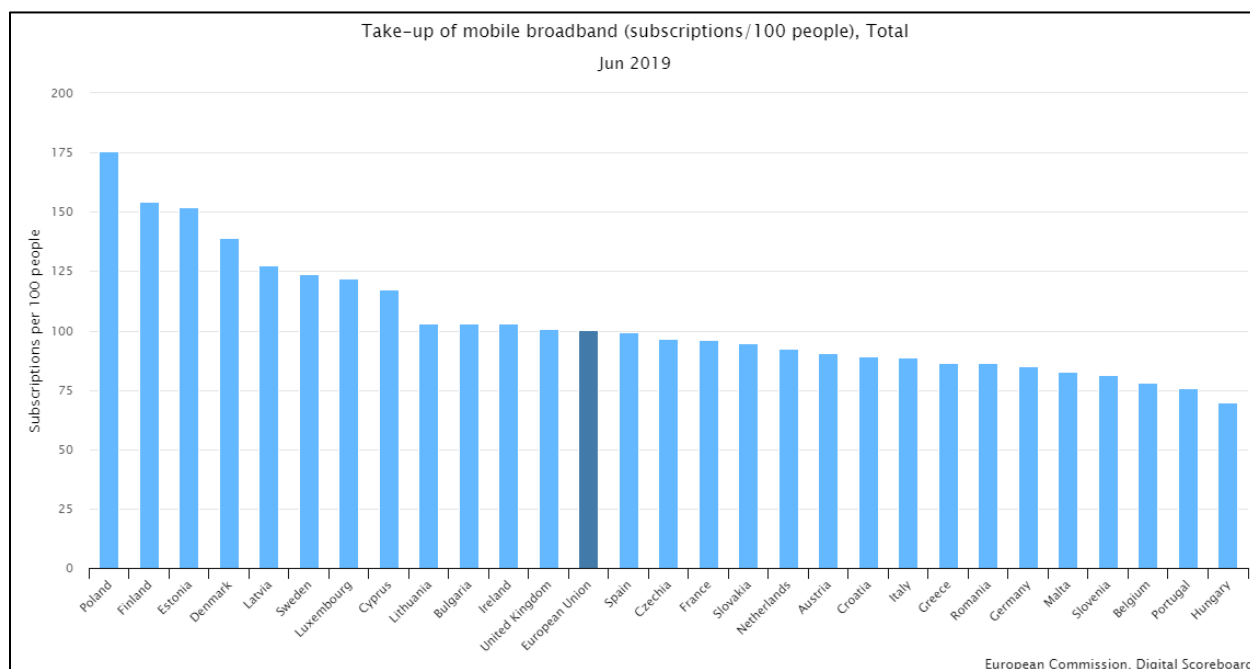
Source: European Commission

Mobile broadband coverage

According to the latest European Commission study[11] (the 2019 Digital Economy and Society Index, DESI) examining mobile network coverage, by the end of June 2018, high speed packet access (HSPA) remained relatively unchanged and continued to provide near universal availability (98.% of EU households, up from 97.9% at the end of June 2017) at the EU level. Moreover, LTE coverage increased by 1 percentage point by mid-2018, indeed overtaking, for the first time, the levels of HSDA coverage, as was expected due to the continuing deployment of LTE networks in many Member States.

Coverage in rural areas has been challenging, as network deployments (especially fixed ones) in these areas are more costly and less in demand. However, LTE services reached 96.1% of rural EU households in 2018 (up from 90.9% in 2017), thanks to the mobile technologies enabling improvement of broadband coverage in regions where fixed network deployment is more challenging or not feasible.

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[11] https://ec.europa.eu/digital-single-market/en/desi

Mobile data traffic in general

According to the 2019 DESI report, mobile broadband traffic per capita in Western Europe[12] is well below the statistics reported for the USA, Japan, South Korea and Russia. Mobile traffic per capita is forecasted to increase significantly by 2022. It is currently 2.4GB per capita in the EU and it is forecast to reach 12GB per capita by 2022 (according to Cisco estimates). Nevertheless, the traffic per capita is significantly higher in the USA (3.8GB), Japan (5.3GB), South Korea (5.8GB) and Russia (4.2GB). Only China, with 1.4GB per capita, is currently below European levels. According to Cisco's estimates, by 2022, Russian mobile broadband traffic per capita will have increased to 25.5GB, followed by South Korea with 23.5GB.

Figure 12: Average mobile traffic per capita forecast to 2022
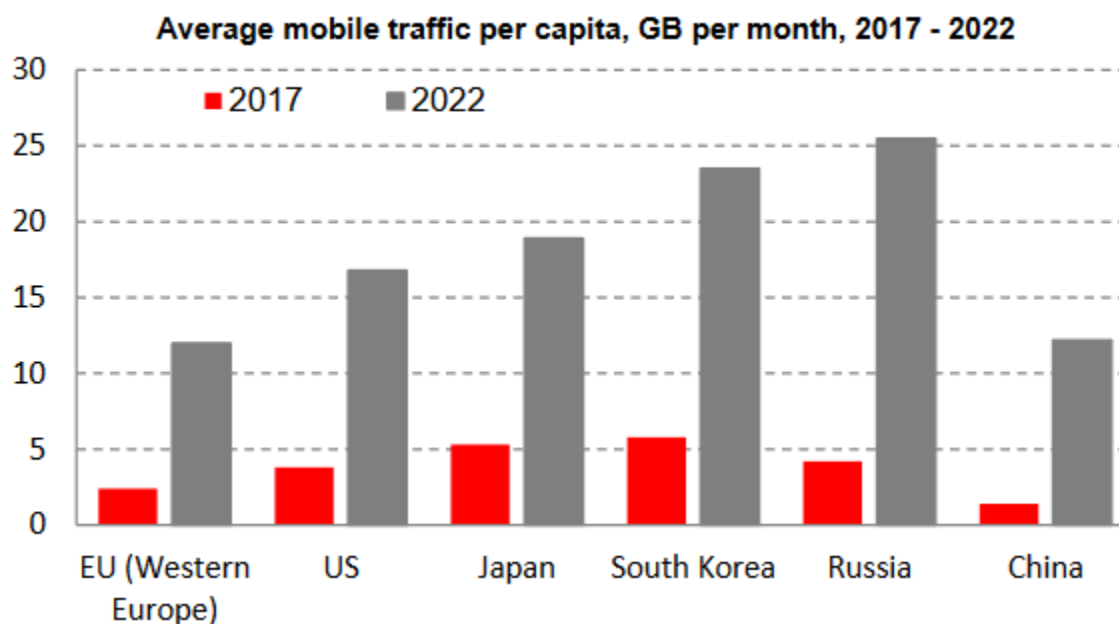
Source: Cisco, VNI Forecast Highlights

Mobile broadband speeds

In addition to comparing Western European mobile traffic per capita, the 2019 DESI also presents a comparison of average mobile speeds in Western Europe with those in the US, Japan, South Korea, Russia, China, and an average of world speeds. The average mobile speed in Western

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[12] Belgium, Denmark, France, Germany, Iceland, Ireland, Italy, Norway, Spain, Sweden, the Netherlands and the United Kingdom

Europe is currently 16 Mbps, ahead of the USA, with 13.5 Mbps, with projects (based on Cisco estimates) highlighted in Figure 13 below.

Figure 13: Average mobile speeds forecast to 2022
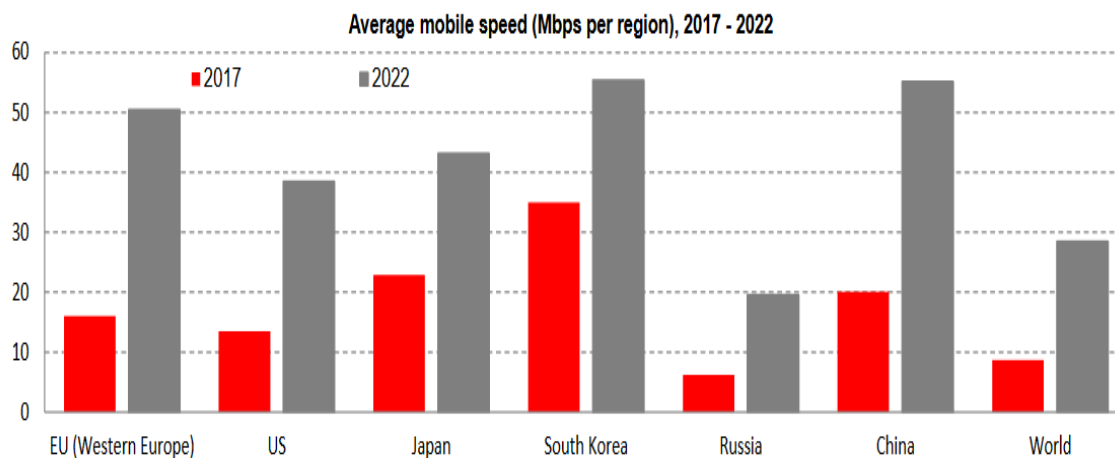
Source: Cisco, VNI Forecast Highlights

3.5 Termination rates

Termination rates at European level

BEREC constantly monitors domestic[13] 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, '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 TRs (Recommendation 009/396/EC), the wholesale rates both for 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.

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

Mobile termination rates

MTRs have been regulated based on cost-oriented pricing in all countries of the EU-28 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 the wholesale level.

As shown in Figure 14 below, wholesale interconnection rates for mobile telephony services in Europe fell markedly between January 2004 and July 2019: the simple average, Avg (S), fell from 14.08 to 0.88 cents per minute, while the weighted average, Avg (W), fell from 14.47 to 0.78 cents per minute[14].

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[14] In the BEREC periodic MTRs benchmark reports, both a simple average and a weighted average 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 14: Average MTR: time series of simple average and weighted average at European level

	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
■ 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
■ 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

Source: BEREC, Termination rates at European level July 2019

The average MTR Avg (S) at the EU level (EU Member States only) stands at 0.78 cents per minute, whereas Avg (W) at EU level is estimated at 0.79 cents per minute. For July 2019, individual Member States' and observers' average rates[15], together with European and EU simple and weighted averages, are shown in Figure 15.

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[15] Average MTR per country is obtained by weighting the average MTR of each operator by its market share, measured in terms of subscribers.

Figure 15: MTR by country, July 2019 (eurocents per minute of service)
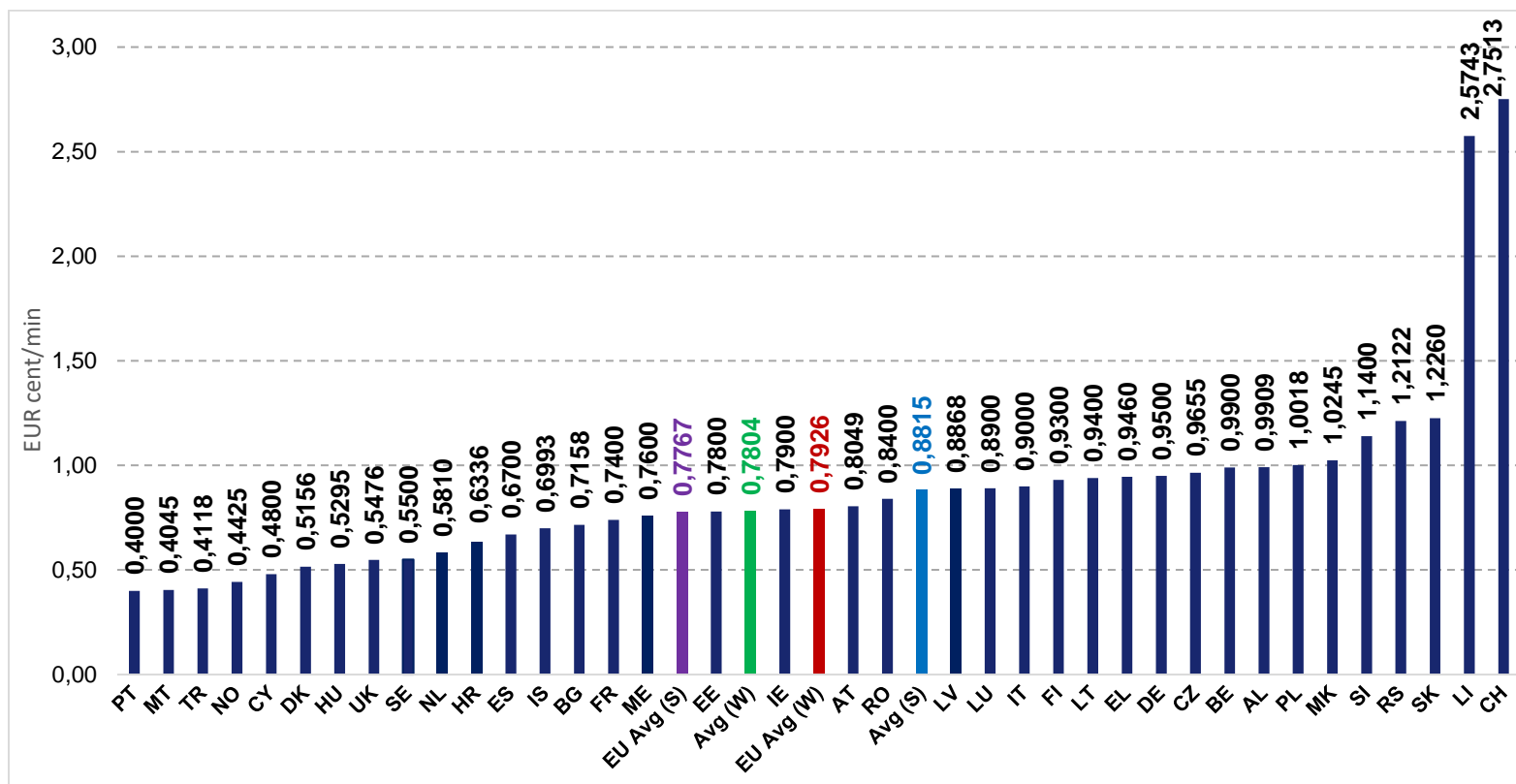
Source: BEREC, Termination rates at European level July 2019

Fixed termination rates

Since the beginning of the liberalisation period, when incumbent operators served all end-users of fixed network services, the termination service has been 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 has 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 two years, a significant reduction in this regulated price has taken place in the EU-28 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, that is, 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 16. Data refer to 1 July 2019 and include simple averages at European level as well the simple average of EU-28 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-28) stood at 0.21 cents per minute.

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[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 (layer 1 is 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 (or 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 16: Overview of incumbents' lowest regulated fixed termination rates per country, July 2019 (eurocents per minute of service)
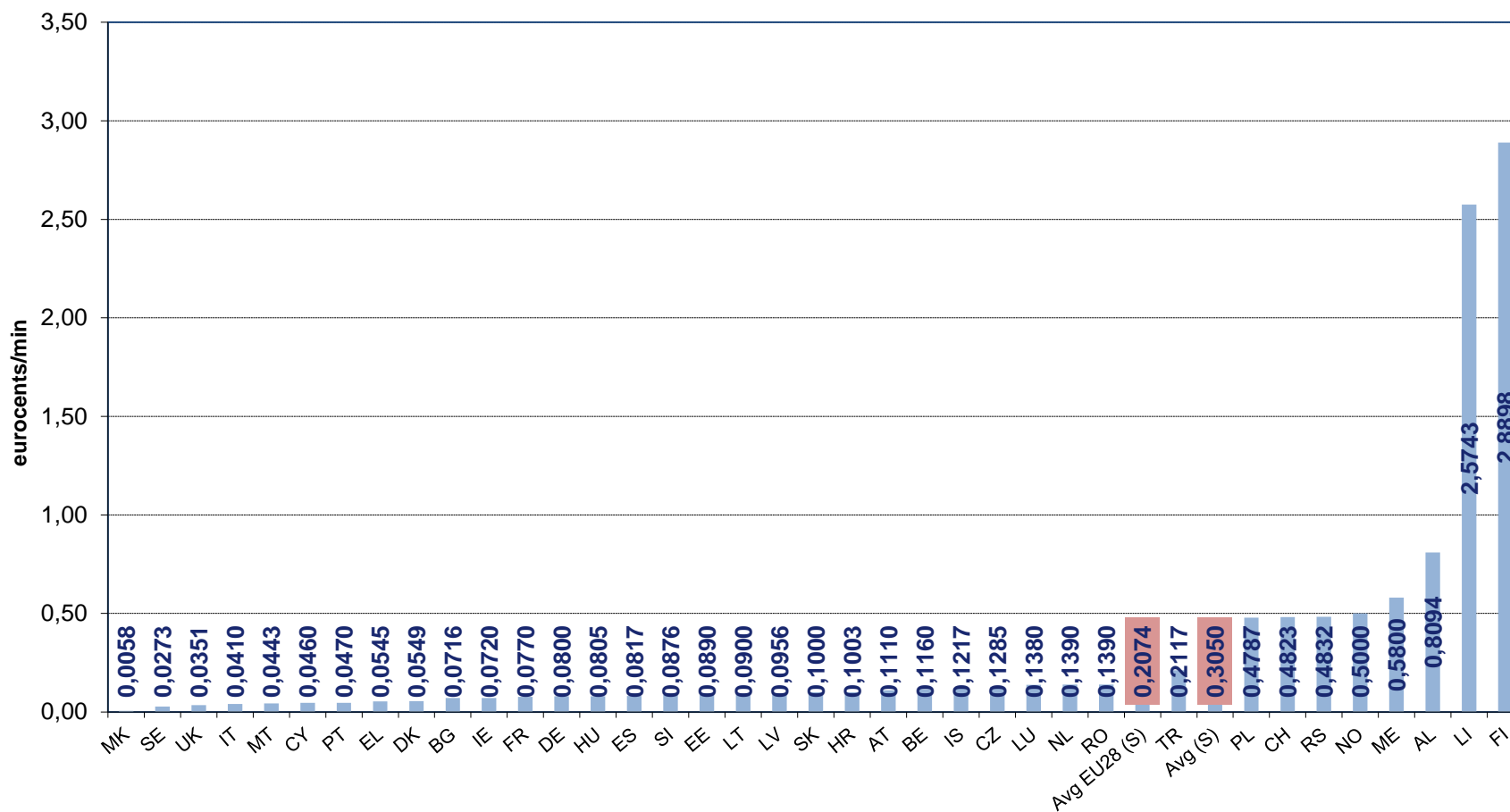
Source: BEREC, Termination rates at European level July 2019

Short message service termination rates

A traditionally important service in terms of revenues 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-28 (i.e. they have been freely set by commercial agreements among operators).

Individual Member States' average rates, together with simple and weighted averages, as of 1 July 2019 are shown in Figure 17.

Figure 17: SMS TRs by country, July 2019 (eurocents per message)
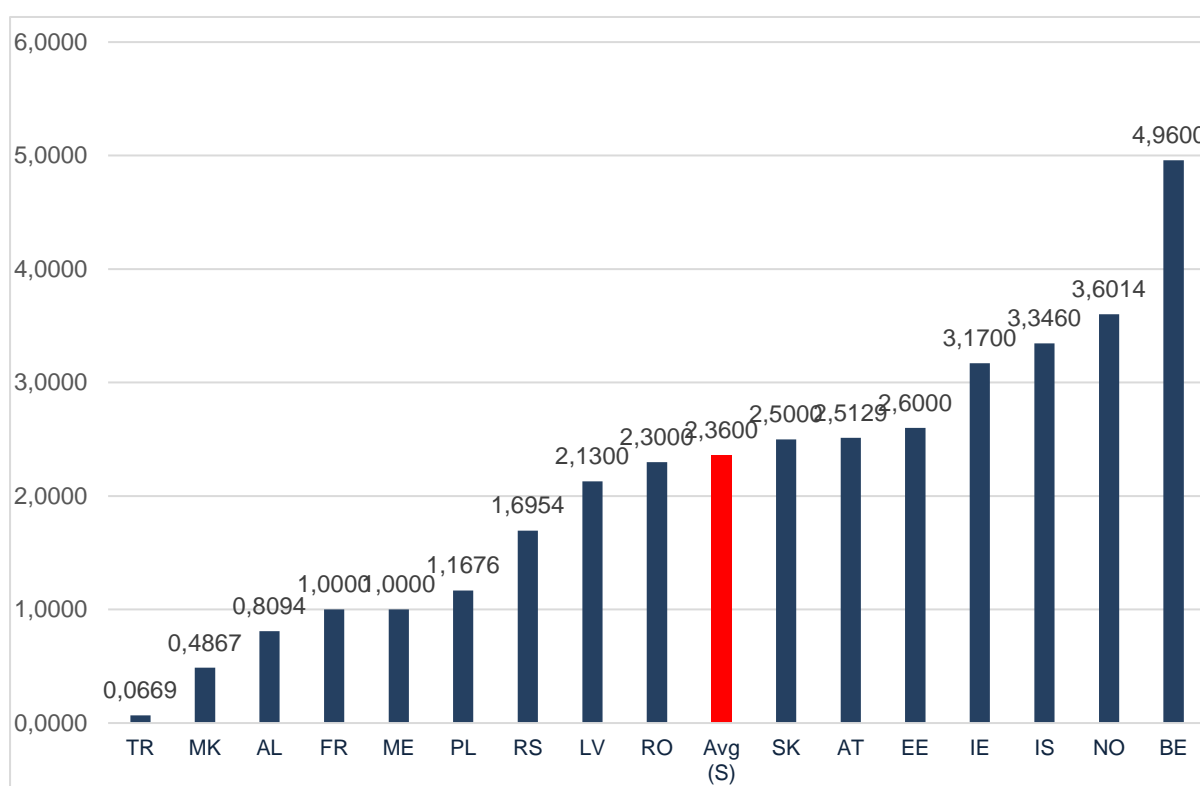
Source: BEREC, Termination rates at European level July 2019[17]

3.6 Regulatory accounting

The overall picture of the cost accounting methodologies is relatively stable in comparison to last year with just a small number of changes by NRAs since last year. There are clear preferences for price control methods (cost orientation alone or in combination with price cap,

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[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), BE (Belgium).

but the overall picture is more differentiated), cost base (current cost accounting - CCA) and allocation methodologies (mainly long run incremental costs (LR(A)IC), with fully distributed costs (FDC) preferred only for few products). The degree of consistent application of methodologies continues to be high and accommodates the use of elements or parameters that reflect national circumstances.

The RA report 2019 provides an analysis more oriented on single products (increasing the scope of monitoring). The 2019 report collects information on 19 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 it is applied mainly for legacy products, while the retail minus category, rarely chosen, refers mainly to Wholesale Line Rental (WLR) and to some extent to Virtual Unbundled Loop Access (VULA) products.

ERT (Economic Replicability Test) price control methodology, in line with the Commission Recommendation (2013/466/EU), is mainly used for VULA and for NGA products, even though we observe an increase of NRAs using cost-orientation for VULA FTTH (Fibre to the Home) and NGA services.

The most frequent cost allocation approach is LRIC/LR(A)IC, for almost all products/markets. LRIC is the preferred approach specifically 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. FDC is the preferred approach for duct access products in Market 4 and WLR. In Market 3b for legacy products both methods are used.

The accounting separation obligation has often been removed in mature and stable environments, such as LLU services in Market 3a (22 NRAs applied this remedy in 2019 compared with 24 in 2018). A particular case are termination markets, where NRAs that have determined prices via pure BU-LRIC models have, in nearly half of cases, removed the accounting separation obligation (17 NRAs out of 33 imposing a price control obligation). With reference to the asset base used, a top-down/accounting approach is still more frequent than a bottom-up model for Markets 3b and 4.

In termination markets, in line with Commission Recommendation 2009/396/EC, a bottom-up approach is more frequent, irrespective of the kind of price control in use. The analysis of the structural data confirms that countries start from very different points in terms of population, topography, market situation etc. These factors influence the regulation strategy of NRAs for the wholesale access markets.

Regarding the WACC, the in-depth survey and the update provided in this report highlight the fact that all NRAs use the Capital Asset Pricing Model (CAP-M) and hence similar parameters for determining the WACC. However, the value of these parameters naturally differs reflecting different national financial market conditions and economic circumstances (e.g. inflation rates, tax rates), the timing of market reviews and the data sources used. An analysis was undertaken with regard to the different years NRAs took the WACC decision to show the impact of the time variable when taking a WACC decision. This year's report also separately summarises WACC information taking into account only EU countries that are subject to the Article 7 procedure.

A specific focus on fixed and mobile markets shows that there is no significant difference in the methodology used to estimate the WACC.

Overall, the 2019 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 second 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 the retail margin squeeze test, the vectoring regulation, the cable regulation and the issue of wholesale-only operators. Outcomes of the survey are simply reported in a descriptive form.

Good progress has been made in developing effective regulatory accounting frameworks to meet the needs of NRAs. However, this is a complex and highly technical topic which requires regular maintenance and enhanced implementation of the regulatory accounting framework as competition develops, technology improves and new regulatory challenges emerge. With the Commission's WACC Notice, BEREC will start to calculate certain WACC parameters according to the methodologies foreseen in the Notice to be used by NRAs.

According to the published Commission's WACC Notice- and as agreed at the 38th Ordinary Plenary Meeting of the BoR, BEREC will estimate two of the WACC parameters, namely a country-specific RFR and an EU-wide ERP in the first half of 2020. Currently it is foreseen that the estimation of the three company-related parameters (beta, gearing and cost of debt), based on the methodology described in the Commission Notice, will also be started in the first half of 2020.

3.7 Forward-looking trends in the electronic communications sector

BEREC needs to consider the impact of rapidly changing markets, new network technologies and the expected policy developments as well as the increasing cross-border nature of digital services.

Due to the fast-changing nature of the markets which BEREC regulates, it is imperative that BEREC keeps pace with and understands the impact that new technologies and business models have on market dynamics to be able to implement appropriate regulatory measures, where required, and achieve the objectives as laid down in the Code.

The path towards the Gigabit Society across the EU implies that the infrastructure of the future will have specific requirements. These include extremely quick response times and seamless integration of different networks and different technologies, in order to allow consumers to switch from one to another without any disruption and enjoy the same customer experience, irrespective of their location and connection type.

From a supply side perspective, operators have historically deployed fixed and mobile networks independently of one another, with limited infrastructure sharing, requiring relevant stand-alone investments[18]. This modus operandi will evolve as the technical development towards fixed mobile convergence and virtualisation enables a stronger structural convergence and cost-benefits from deploying and operating a shared infrastructure. Therefore, in some cases, the integration of mobile and fixed networks may even be necessary, e.g. to manage small cells inside buildings.[19]

The 5G network, designed to be a 'cloud of solutions', will be part of a common infrastructure combining radio, satellite and optical networks. Beginning from at least one 5G network per city per Member State by 2020, the European Commission expects 5G coverage in all urban areas and along all major transport routes in the Union by 2025.[20]

The transition to 5G will also pave the way for network virtualisation and disaggregation[21] which will change how networks are built and operated and how services managed. An important feature of 5G is network slicing, which promises to enhance network efficiency and improve service performance through the ability to designate each service or user with the required quality at the required time.

The network intelligence will likely become more centralised through network orchestration[22] while service quality will depend on the available resources at the 'edge' of the network. Data centres and content delivery networks, a key component in cloud computing and already an area of considerable growth and expansion, will continue to play an important role for the provision of high-quality digital services.

5G is expected to create an ecosystem for technical and business innovation involving vertical markets[23]. It is likely to become the cornerstone for digital connectivity and a major driver of economic growth, promoting competition and serving social needs. 5G will allow the implementation of new services such as telemedicine, massive numbers of devices for the Internet of Things (IoT), autonomous vehicles and smart cities, eventually connecting everything and everyone to a single digital ecosystem. In order to ensure these developments can take place and are not delayed, an appropriate regulatory framework needs to be in place as well, e.g. spectrum regulation, access regulation to ensure access to sites, infrastructure sharing etc.

While the digitalisation of society holds great opportunities and the potential for huge efficiency gains, there will also be new risks and challenges associated with this development. Besides the attention given to the (shared) roll-out, interoperability, spectrum availability and business

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[18] http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DSTI/ICCP/CISP(2015)2/FINAL&docLanguage=En

[19] https://www.ericsson.com/en/networks/offerings/urban-wireless/indoor-small-cells

[20] https://ec.europa.eu/digital-single-market/en/5g-europe-action-plan

[21] Network Function Disaggregation (NFD) defines the evolution of switching and routing appliances towards totally decoupled, open, components.

[22] Software Defined Networking (SDN) and Network Functions Virtualisation (NFV) aim to transform the way that network operators design and operate networks; however, technologically as well as with regards to the alleged business impact, they appear to be approaching a phase of disillusionment and where at least some of the expectations appear inflated.

[23] Such as energy, agriculture, city management, government, healthcare, manufacturing, public transportation etc.

models of 5G, concerns relating to security, robustness, privacy and integrity of the digital ecosystem have grown in recent years and will likely continue to require the attention of regulators and policy makers. Making sure that everyone has the ability and capacity to participate in the digital society, i.e. bridging the digital divide and providing functional access for disabled, will be just as important as the realisation of a digital society, and will only be possible when all citizens are included. Therefore, consumer protection needs to be up to the new challenges and regulators must be active in enforcing obligations set out in law e.g. transparency and more generally consumer rights.

In order to accelerate the transition to digital services and the wider digital ecosystem, broader access to higher quality and higher resilience internet-based services remain important. The internet has intensified competition by making it easier for consumers to compare prices and for companies to deliver services to consumers, creating a disruptive effect on the market dynamics in various service markets. However, as market fundamentals have changed, new structures are establishing and new potential bottlenecks are forming. The new market dynamics are by no means limited to the electronic communications sector, but affect more or less all industries in our connected society. The increasing availability of data and analytical tools is changing a large portion of the European economy, enabling innovative business models, new products and processes, cost reductions and better informed decisions by consumers, institutions and firms, as well as providing new growth opportunities.[24]

Data-centric business models are now becoming the norm in the digital economy, and access to data and the use of algorithms is likely to have significant impact on competition dynamics in digital service markets. Network effects, scale and scope economies make growth the most prevalent strategy in platform markets, which can lead to new concentrated market structures. In addition, they raise questions about the impact of digital platforms[25] both on the principle of internet openness and on competition, and whether the current competition framework can address any anti-competitive behaviour or whether sector-specific regulation might be warranted.

As an intrinsic part of digitalisation, big data and Artificial Intelligence (AI) are also expected to have a strong impact, both socially and in the business environment. AI is a general-purpose technology with a multitude of applications in all industries, including healthcare, government, transport and the financial sector. The versatility of AI in products and services, in combination with its potential to impact citizens in many ways, is the key reason why AI has become an area of strategic importance for the European Union.

AI-based systems are furthermore of particular relevance[26] to the telecommunications industry due to their potential for various stages of operations (network roll-out, network optimisation, transmission optimisation etc.), new services (new revenue streams or business models, different categories/classes of services), customer service (customer service enhanced by natural language processing), data management (collection, validation, analysis etc.) or security (fraud detection, cybersecurity etc.). Traditional telecommunications operators

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[24] BEREC report on the Data Economy BoR (19) 106
[25] https://ec.europa.eu/digital-single-market/en/policies/online-platforms
[26] https://techsee.me/blog/artificial-intelligence-in-telecommunications-industry/

may employ AI technologies in regulated areas, potentially affecting efforts in net neutrality, end-user rights, data protection, competition (e.g. in terms of data economy) or security.

Besides the ongoing digital transformation, climate change is another defining process of our time. Digitalisation promises to bring major efficiency gains that translate into major reductions of greenhouse gas emissions[27]. At the same time, the digital sector's environmental footprint is increasing with energy usage rising. Currently, ICT accounts for around 4%[28] of the European carbon footprint (equivalent to civil aviation) with an overall 8% to 10% upwards trend[29]. Hence, the environmental consequences of digital technologies require careful assessment of direct impacts, such as energy consumption and end-of-life disposal impacts, and indirect impacts, e.g. change in consumption patterns and choice.

Finally, on the policy side, in view of the strategic priorities adopted by the European Commission, there are several policy goals for the digital market in the EU that are relevant for BEREC to consider:

- creating the right framework to allow Europe to make the most of the digital transition;

- promoting full connectivity by stimulating private investments while reducing the cost of roll-out in very high capacity networks;

- developing a new Digital Services Act and assessing the need for ex ante rules on digital platforms to tackle bottleneck issues;

- strengthening the EU's cybersecurity framework and capabilities and develop a coordinated European approach on artificial intelligence;

- strong focus on digital innovation, while ensuring the continued modernisation of key transport systems;

- closely monitoring the transition to the digital economy which raises many other policy and regulatory issues, from competition issues related to market power, to labour issues related to the platform economy or taxation;

- updating of the Digital Education Action Plan;

- a new European Green Deal which will be one of the new European Commission's main projects.

These priorities will guide the work of the EU Commission in 2020-2024. They are also likely to have a strong impact on BEREC's work during this period.

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[27] See Communication of the Commission 'A Green Planet For All', October 2018, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018DC0773

[28] https://ictfootprint.eu/en/about/ict-carbon-footprint/ict-carbon-footprint

[29] Lean ICT – Towards digital sobriety, The Shift Project, 2019

4. Regulatory framework

In terms of sectoral regulatory developments, the reference period was characterised by the launch of the national processes for the transposition of Directive 2018/1972 bearing the EECC, which was eventually adopted and published in the Official Journal of the EU on 17 December 2018. Furthermore, the activities began early in 2019 for the fourth review of the Recommendation on Relevant Markets, by means of a targeted public consultation to which BEREC provided its contribution last June.

BEREC focused accordingly on ensuring a platform for its member NRAs to exchange views on any national transposition issue arising, as well as on implementing the new BEREC Regulation, thereby following up on a set of legal requirements vital to the functioning of BEREC, including updating the Rules of Procedure of the Board of Regulators and Management Board, both adopted in April 2019. BEREC also worked on ensuring the approximation of the notification requirements for general authorisation and in line with Article 12(4) of the EECC it adopted guidelines for the notification template in December 2019. Furthermore, 2019 saw BEREC confronted with certain challenges stemming from the new formulation of the BEREC Regulation, including Article 35, which required, under the chairmanship's coordination, development of specific working arrangements aimed at defining the terms of participation of third country NRAs in BEREC's work.

5. Openness of the internet

In 2019, BEREC initiated an update of the Net Neutrality Guidelines by having a written consultation on a draft updated version of the guidelines. This project will be finalized in 2020. In 2019, an implementation report was published as in previous years, and the NRAs also discussed national cases and questions. Procurement of the net neutrality measurement open source software was concluded in late 2019 but some further development and training is required before the tool is rolled out by NRAs.

Another of BEREC's strategic goals for 2019 was to foster a consistent approach to the net neutrality principles and thus safeguard an open internet throughout Europe. In this respect, BEREC has continued to act as a forum that supports NRAs in applying the Open Internet Regulation consistently in Europe. Furthermore, BEREC has continued its work looking into how the open internet rules are affected by changes in markets and new technologies. In 2019, work on updating the Guidelines on Net Neutrality started, and as is becoming usual practice, an implementation report has been published.

6. International roaming developments

Roaming charges in the EU and the EEA were made a thing of history on 15 June 2017. The Roaming Regulation (Regulation (EU) 2015/2120, published in the Official Journal of 26 November 2015, and including amendments to 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 an additional surcharge ('Roam Like at Home' – RLAH). Only in exceptional cases may the operator levy a surcharge for roaming in the EU.

To assess the competitive developments and the impact of RLAH on the EU-wide roaming markets, BEREC has to regularly collect data from NRAs on the development of retail and wholesale charges for regulated voice, SMS and data roaming services, including 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 collected data, BEREC has to report 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 relate to each other. The following paragraphs give the results of these exercises and show the developments in terms of volumes and revenues for both the retail and wholesale markets.

The introduction of RLAH services, coupled with the growing demand for data services, has changed the international roaming market. A relevant point is that the RLAH services enabled a substantial increase in international roaming traffic. The minutes generated under RLAH tariffs account for the majority of voice traffic. In total, 88.10% of minutes of calls made and 85.68% of minutes of calls received in Q3 2019 were generated by subscribers of RLAH tariffs. For text messages sent while roaming within EEA countries, RLAH tariffs accounted for 93.43% of the total volume in Q3 2019. Around 89.48% of data traffic in Q3 2019 was based on the RLAH data tariff while roaming. BEREC data also show clear evidence of seasonal movements. For example, compared with Q3 2018, the data roaming traffic decreased by 14.12% in Q2 2019. To deal with the impact of seasonality, BEREC compared its data with data from the same quarter in the previous year. Increased volumes can be seen in the relationship between Q3 2018 and Q3 2019. Data roaming consumption ranged from 0.19 GB to 1.61 GB per roaming subscriber monthly in Q3 2019 in comparison with a range from 0.09 GB to 1.31 GB in Q3 2018. In comparison with the same quarter (Q3) in the previous year, total retail data traffic in 2019 increased by 43.7% while the total retail traffic for calls made and calls received exhibited marginal increase.

BEREC analysed domestic retail prices and found that it is hard to disaggregate the different mobile communications services, since they are often provided as part of a bundle of several services, including intra-EEA roaming communications and, in several cases, non-mobile services as well. Operators are finding it difficult to organise their revenue data by individual service categories, such as fixed telephony, mobile telephony, fixed broadband and intra-EEA roaming communications, and no common methodology has been defined for this purpose. Bundles challenge this practice, as individual service categories require bundle revenues 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). Further conclusions on the price levels of mobile communications services can be made only by 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 2019 varies considerably between

countries, ranging from EUR 3.75 per month to EUR 30.02 per month, with a weighted EEA average of EUR 10.47. Disproportion between individual ARRPUs could be caused by the different methodologies used by operators to allocate the revenues relative to different domestic mobile services. With regard to Q2 2019, the ARRPU in Q3 2019 remains relatively stable overall. At the wholesale level, the voice, SMS and data roaming charges set between operators have fallen significantly below the regulated average caps. The applicable price caps and the related EEA average prices during the data collection period were:

Service at wholesale level (no VAT)	Q2 2019		Q3 2019	
	Price Cap	EEA Average	Price Cap	EEA Average
Wholesale voice (€c/minute)	3.2	2.07	3.2	2.10
Wholesale SMS (€c/SMS)	1	0.31	1	0.31
Wholesale data (€/GB[30])	4.5	1.69	4.5	1.68

For data services in particular, there has been a significant decrease in the EEA average wholesale price per GB and a significant increase in the retail traffic (see Figures 18 and 19 below).

Figure 18: EEA average wholesale data price per GB, Q2 16 – Q3 19 (balanced, unbalanced, total traffic, RoW traffic)
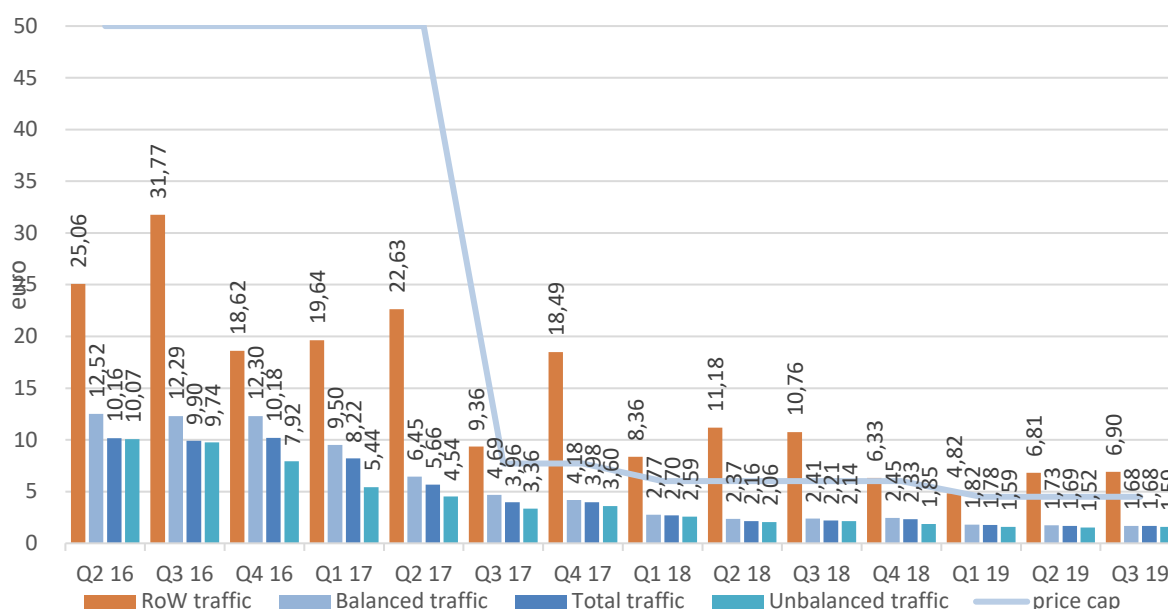
Source: BEREC, International roaming BEREC benchmark data report April 2019-September 2019

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[30] Conversion of gigabytes to megabytes 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 1000 megabytes.

Figure 19: EEA retail data traffic, Q1 2013 - Q3 2019 (millions of GB)
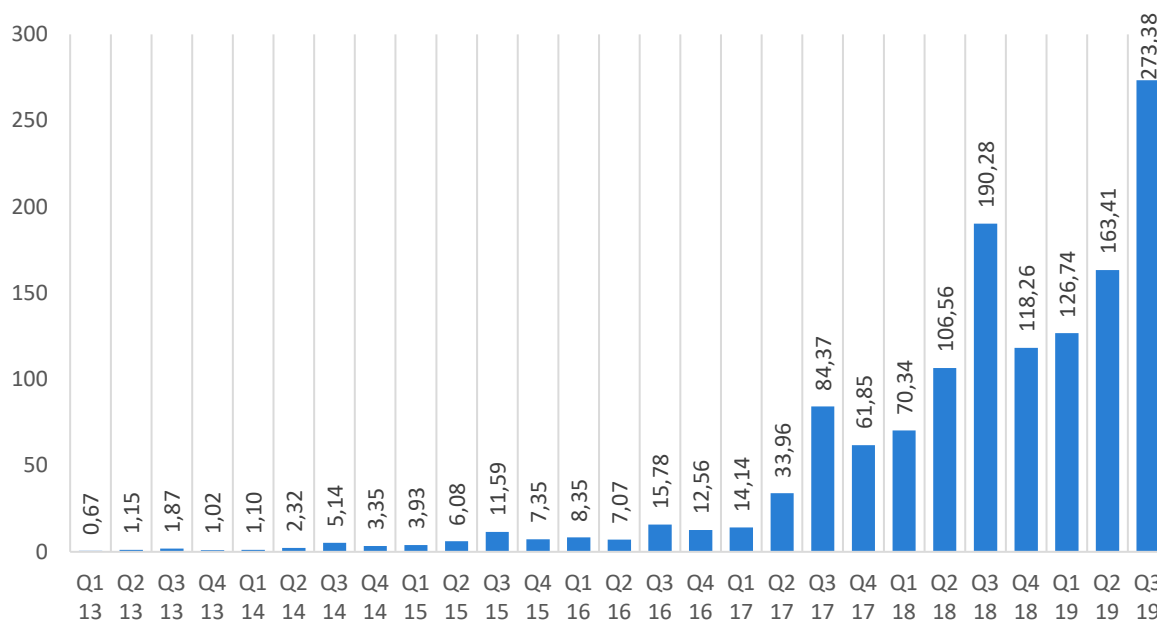
Source: BEREC, International roaming BEREC benchmark data report April 2019-September 2019

In addition, according to the data collected, BEREC found that the ARRPU of MNOs was higher than MVNOs, and roaming consumption was lower for MVNOs' subscribers than MNOs' subscribers.

7. Conclusions

The BEREC Work Programme 2019 set out an ambitious plan, which included the work that BEREC was mandatorily tasked with in light of the European Electronic Communications Code along with other projects that BEREC considered important in the context of the strategic priorities set out in its Strategy (2018-2020). In 2019, while BEREC continued to address current regulatory challenges, the work and outputs that were completed or commenced should contribute to the development of the electronic communications sector, which is crucial to support economic, technological and social developments in the coming years.

BEREC also continued to engage proactively with stakeholders during the year, carefully considering their submissions, when preparing the BEREC 2020 Work Programme and also the multiple sets of Guidelines that BEREC has been tasked with. BEREC's 7th Stakeholder Forum in Brussels on 16 October provided the opportunity for face-to-face engagement with stakeholders and this allowed attendees from the telecoms and digital communications industries the opportunity to interact with BEREC on the topic of cybersecurity in the context of 5G networks, to express their thoughts on the draft BEREC Work Programme 2020 and gain a futurist's insight into technology development.

Because of the extent of the mandatory work tasked to BEREC in light of the EECC, some of the projects set out in the Work Programme 2019 will necessarily be carried over into, and be completed in, 2020. Given the timing for transposition deadlines set out in the EECC, particularly with respect to guidelines, BEREC has paid specific attention to when public consultations are due to take place in order to allow stakeholders sufficient opportunity to respond to such consultations.

Furthermore, to mark BEREC's 10th anniversary, BEREC held a joint conference with the International Institute of Communications (IIC) in Riga on 25-26 June. This event was entitled 'Competing Continents: the pursuit of excellence in electronic communications' and brought together statutory national regulators and industry in a collegial setting to debate policy issues. The event was open to all stakeholders from the telecommunications, media and technology sectors.

Facilitating and insuring a high level of investment in very high capacity networks (VHCN) was a key focus of the work of BEREC in 2019. Not only did BEREC work on Guidelines related to the topic of VHCN, but it also commissioned a study into the determinants of investment in VHCN, cognisant of the general objective in the EECC to promote connectivity and access to, and take-up of, VHCN.

In addition to its mandatory work on Guidelines, BEREC addressed various other topics, including regulatory approaches and experiences on migration from legacy infrastructures to fibre-based networks. It also commenced a project to look at the scope of data that could be gathered from Authorised Undertakings and OTTs that might be the subject of a BEREC template. The potential output from this project is intended to promote the rationalisation, coordination and standardisation of the collection of data by NRAs.

In addition to carrying out its advisory duty for all EU institutions, in 2019 BEREC continued to promote thematic exchanges with other European and international regulatory cooperation platforms and bodies operating in both adjacent and different economic sectors, such as the ITU, OECD, RSPG, ENISA, ERGA, ERGP, ECN and BEUC. Furthermore, BEREC continued to engage in dialogue with NRAs based outside the EU, as well as with international regulatory networks, policy makers and institutions involved in electronic communications matters. BEREC closely followed international trends in technology and changing business models in order to retain the capacity to address challenges swiftly and effectively as they arise. As regions outside the EU regulators' networks have been expressing great interest in the European regulatory approach, in 2019 BEREC continued to provide support to the European Commission with respect to its Western Balkans initiative. BEREC also provided support to the Commission regarding the Policy and Regulatory Initiative for Digital Africa (PRIDA), as well as continuing to develop and strengthen contacts with international regulatory authorities such as the FCC, TRAI and CRTC, and with regional regulatory networks (EMERG, EaPeReg and Regulatel), in accordance with the BEREC Regulation.

As BEREC's first decade comes to a close, BEREC's constituent NRAs now face into the 2020s and the next set of challenges and opportunities to be dealt with, and worked on, together. As in its first decade, BEREC will continue to follow the approach whereby NRAs work collaboratively to produce Common Positions, Guidelines and best practices, all with the aim of developing the Single Market, promoting connectivity, competition and investment, and empowering and protecting end-users.

PART B: Annual Report on BEREC activities in 2019

Annual Report on BEREC activities in 2019, under 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 report, the activities of the Body of European Regulators for Electronic Communications (BEREC) in 2019 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 Office.

As usual, the annual report on BEREC's activities in 2019 is based on the work streams and priorities that were set out in the BEREC Work Programme 2019 and, indeed, updated throughout the year. The report, therefore, mainly covers the work carried out by BEREC's Working Groups and ad hoc working groups.

In view of the new policy objective in the EECC to promote connectivity and access to, and take-up of, very high capacity networks, one of BEREC's work items for 2019 was the completion of a study on the determinants of investment in Very High Capacity Networks to consider how the complexity of VHCN investment within regulated markets can be explained with a system dynamics model and to understand how the underlying structures, path dependences and actions of all stakeholders in this system can influence observed behaviours.

Throughout 2019, BEREC maintained its policy of engagement with NRAs from other jurisdictions and the memorandums of understanding (MoUs) with both EaPeReg, the Eastern Partnership (Armenia, Azerbaijan, Belarus, Georgia, the Republic of Moldova and Ukraine) Electronic Communications Regulators Network and Regulatel, the international cooperation platform representing telecommunications regulatory agencies in Latin America. In addition, 2019 also saw BEREC sign two new MoUs with the International Telecommunication Union (ITU) and, closer to home, with the Radio Spectrum Policy Group (RSPG). These MoU establish a high-level (non-binding) framework, which facilitates sharing of reports, guidelines, best practices and case studies on relevant topics.

Starting in 2018, BEREC began to turn its attention to the next decade (as 2019 marked the end of its first ten years). A number of workshops, internal meetings and discussions were held towards the end of 2018 and in early 2019, focusing on what was termed 'BEREC: the next decade'. The main topics of discussion included how BEREC would communicate its message more effectively, how BEREC could enhance engagement and transparency with respect to stakeholders and how a change programme could be initiated in order to improve the effectiveness of the Agency for Support for BEREC (BEREC Office).

2. Work Programme 2019

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

2.1.1. Guidelines on very high capacity networks

The Code (EECC, Article 3(3)) has among its objectives 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 shall not impose certain (symmetric) obligations on wholesale-only undertakings depend on access to a very high capacity network (Article 61(3) 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.'

An essential basis of the project was a detailed analysis of the legal provisions in the EECC which define the term 'very high capacity networks' (Article 2(2), Recital 13). In addition, it was necessary to collect data on achievable network performance of networks defined in Recital 13. For this reason, BEREC held a call for initial stakeholder input in three phases in the second and third quarters of 2019. The BEREC guidelines on very high capacity networks will be based on the comprehensive information received. The adoption of the draft Guidelines for public consultation is planned for Plenary 1 2020.

Document:
Adoption of final Guidelines at Plenary 4 2020

2.1.2. BEREC Study on the determinants of investment in very high capacity networks

Enhancing the conditions for investment is a key activity for national telecommunications regulatory authorities seeking to promote competition and optimise end-user welfare. This has been a research project, with the objective of providing insight into the complex interplay of factors which impact investment in network infrastructure. The project has involved the development of a system dynamics model that captures these factors and enables simulation and testing of various hypotheses about the impact of regulatory measures within the EU, as well as other factors that can influence the level of investment in very high capacity fixed networks (VHCN).

The key research question for the project has been – what are the factors, including regulatory factors, which influence the level, nature and timing of investment in very high capacity telecommunication networks in BEREC Member States?

The key aims have been to generate a conceptual system dynamics model which captures and illustrates the complex interplay and feedback loops of factors influencing the timing, level and nature of investment in very high capacity digital infrastructure in countries in Europe, and to use this model to simulate the effects of different regulatory choices and the interaction between investment and competition.

The project has proceeded by completing reports comprising of the following:

- a survey of the relevant literature;

- the development of a conceptual and theoretical system dynamics model;

- qualitative conclusions arising from the analysis of the conceptual model;

- the identification of the data required to calibrate the model.

Document :

BoR (19) 246: Study on the determinants of investment in VHCN – a System Dynamics approach

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2.1.3. 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 shall, 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.'

BEREC published draft Guidelines on this topic on 7 October 2019 followed by a public consultation until 21 November 2019. These draft Guidelines are designed in accordance with Article 61(7) of the EECC and intended to provide guidance to NRAs on common approaches to the identification of the NTP in different network topologies. NRAs shall take utmost account of these Guidelines when defining the location of NTPs. The Guidelines shall contribute to the harmonisation of the location of NTPs in the EU.

The draft Guidelines consist of three sections. The section 'General aspects' provide information on four general aspects e.g. the boundary function of the NTP and the impact of the NTP location on the telecommunications terminal equipment (TTE)).

The section 'Location of the fixed NTP' defines the criteria NRAs shall take into 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 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 for three different NTP locations (A, B, C) this impact is analysed with the following results. The degree that the NTP location fosters innovation and competition on the TTE market is highest for point A, lower for point B and still lower for point C.

The third criterion is 'Assessment whether there is an objective technological necessity for equipment to be part of the public network'. It follows from legal provisions with regard to the freedom of end-users to use the TTE of their choice in Regulation (EU) 2015/2120 and Directive 2008/63/EC and the impact of the NTP location on the TTE market that, unless there is an objective technological necessity for equipment at the customer premises to be considered part of the public network, it is part of the TTE. For these reasons, and in accordance with paragraphs 26 and 27 of the 2016 BEREC Guidelines on net neutrality rules, NRAs shall assess whether there is an objective technological necessity for equipment to be considered part of the public network; the determination of the fixed NTP location needs to be based on the outcome of this assessment. The NRA assessment shall in particular consider the following criteria:

    i.   interoperability between public network and TTE;

    ii.   simplicity of the operation of the public network;

    iii.   network security;

    iv.   data protection;

    v.   local traffic;

    vi.   fixed-line services based on wireless technology.

For each criterion, basic aspects of the impact of different NTP locations (A, B, C) are presented and, as a result, the aspects which need to be taken into particular account in the NRA assessment.

The last section is 'Location of the mobile NTP'. Today, end-users are able to use their own mobile equipment in all 28 EU countries, which shows that there is no objective technological necessity for mobile equipment to be considered part of the public mobile network.

Therefore, when defining the mobile NTP location, NRAs shall determine that the mobile NTP is at a location (e.g. the air interface between mobile equipment and base station) which permits end-users to (continue to) use their own mobile equipment. The adoption of the final Guidelines for publication is planned at Plenary 1 2020.

Document:

BoR (19) 181: Draft BEREC Guidelines on common approaches to the identification of the network termination point in different network topologies

Adoption of final Guidelines at Plenary 1 2020

2.1.4. Guidelines on the criteria for a consistent application of Article 61(3)

The EECC (Article 61(3)) foresees that NRAs may impose, upon reasonable request, access to wiring and cables and associated facilities inside buildings or up to the first concentration or distribution point, as determined by the NRA, on electronic communication network providers and owners of such network elements, where replication of those network elements would be economically inefficient or physically impracticable.

Where these obligations do not sufficiently address economic or physical barriers to replication, it may extend the imposition of such access obligations (including active or virtual access obligations if justified) beyond the first concentration or distribution point, to a point capable of hosting a sufficient number of end-user connections to be commercially viable for efficient access seekers. BEREC shall publish guidelines to set out the relevant criteria for determining:

- the first concentration or distribution point;

- 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;

- which network deployments can be considered new;

- which projects can be considered small; and

- which economic or physical barriers to replication are high and non-transitory.

In mid-2019, BEREC carried out a call for initial stakeholder input. The stakeholder submissions received will be used as an input to BEREC's assessment when drafting the Guidelines. The adoption of the draft Guidelines for public consultation is planned for Plenary 2 2020 and the adoption of the final Guidelines for publication at Plenary 4 2020.

Document:

Adoption of final Guidelines at Plenary 4 2020

2.1.5. Opinion on the functioning of the roaming market

The European Commission (EC) is set to publish a review of the Roaming Regulation after having consulted BEREC by the end of 2019. In June 2019, BEREC provided input based on information collected from NRAs and operators (MNOs and MVNOs/resellers) for the

elements laid down in Article 19 (3) of the Roaming Regulation, apart from item (g), for which additional input from the EC/Axon cost study was required. In September 2019, BEREC published its supplementary analysis on wholesale roaming costs, taking into account the output of the cost study that Axon conducted on behalf of the EC.

BEREC recognised that the overall objective of the RLAH regulation has been a success and suggested a series of issues that the EC could consider in any future review of the Roaming Regulation, as BEREC does not expect that the competitive conditions in the roaming market will change in the near future in such a way that regulatory intervention will no longer be required.

Documents:

BoR (19) 101: BEREC Opinion on the functioning of the roaming market, as input to the Commission's evaluation

BoR (19) 168: BEREC supplementary analysis on wholesale roaming costs

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2.1.6. Guidelines on the consistent application of the co-investment criteria

Article 76 of the 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 of the 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 shall determine whether the offer to co-invest meets the specific cumulative conditions set out in Article 76(1) paragraphs (a) to (e), in order to decide not to impose any additional obligations pursuant to Article 68 as regards 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 preparing the corresponding draft Guidelines on the application of Article 76 that are to be opened to public consultation in June 2020. It has also organised two stakeholders' workshop with the main sector organisations (March 2019 and January 2020) to collect their views on the issues to be addressed in the guidelines, and prepared an internal report on the scoping of the guidelines.

Document:

Adoption of final Guidelines at Plenary 4 2020

2.1.7. Opinion on the review of the EC Recommendation on Relevant Markets

According to Article 64 of the EECC, the European Commission shall adopt a Recommendation on Relevant Product and Service Markets. The Recommendation shall identify those product and service markets within the electronic communications sector the characteristics of which may be such as to justify the imposition of regulatory obligations set out in this Directive, without prejudice to markets that may be defined in specific cases under

competition law. This new Recommendation will be the evolution of the Recommendation in force on Relevant Product and Service Markets reviewed in 2014. This Recommendation shall be reviewed at the latest by the transposition date of the EECC, and the Commission shall thereafter regularly review the Recommendation.

According to Article 64 of the EECC, the EC must take utmost account of the opinion of BEREC. The EC launched a targeted consultation on the review of the Recommendation on Relevant Markets in February 2019, with BEREC submitting its view on June 2019. In January 2020, BEREC also contributed to a workshop organised by the EC where consultants presented the intermediary results of the study commissioned by EC on the evolutions and potential treatment of specific markets. BEREC is to prepare its opinion on the draft EC Recommendation which is expected for June 2020.

Document:

BoR (19) 107: BEREC response to the EC public consultation on the review of the Recommendation on Relevant Markets

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2.1.8. Migration from legacy to fibre-based networks

The roll-out of NGA networks, in particular of FTTH, increasingly gives rise to situations in which the legacy copper network infrastructure becomes redundant, and incumbent operators may want to de-commission this legacy network infrastructure. In this case, wholesale customers may have to be migrated from copper unbundling or DSL bitstream to other NGA wholesale access products (e.g. duct access, fibre unbundling, or virtual unbundled local access (VULA) or even to solutions based on fixed-wireless access/mobile technology fulfilling NGA requirements). Rules for such a migration are provided for in the European Commission's Recommendation on NGA of 2010 (Article 39 to 41) and also in the BEREC Common Positions on best practices in remedies on Markets 3a, 3b and 4, which were published in 2012. Going forward, NRAs must also comply with the provisions for such a migration in the EECC (Article 81).

The BEREC report summarises country case presentations from Italy, Norway, Portugal, Spain and Sweden on migration from legacy infrastructure to fibre-based networks held during an internal workshop on 4 September 2019 in Brussels. It also includes information on Estonia based on answers to a questionnaire. The purpose of the workshop was to better understand where these countries stand with regard to the migration from legacy infrastructures to fibre-based networks. It was structured in line with a questionnaire which can be found in the annex of the summary report, to allow for some comparisons across countries addressing inter alia the following elements:

- which part(s) of the legacy access infrastructure the SMP operator wants to de-commission (e.g. the MDF location);

- the framework for the migration from copper to fibre-based access networks;

- the notice period, including the factors (e.g. availability of alternatives) that were taken into account when it was set;

- the information on network modifications (e.g. de-commissioning MDFs) the SMP operator has to provide;

- how long the existing obligations will remain in place;

- the procedures used by the NRA to establish the rules for the migration; and

- the stakeholders involved (e.g. alternative operators, associations, consumer organisations) and how they were involved (e.g. workshops, public consultation).

The presentations were focused on the migration to fibre-based networks and did not consider migration from traditional telephony network to NGN in general, which BEREC had already analysed in two reports (BoR (15) 196, BoR (16) 163), nor migration from leased lines with traditional interfaces to Ethernet-based leased lines in general.

Document:

BoR (19) 236: BEREC summary report on the outcome of an internal workshop on 'Migration from legacy infrastructures to fibre-based networks'

2.1.9. Guidelines for geographical surveys of network deployments

Article 22(1) of the EECC establishes that NRAs and/or Other Competent Authorities (OCAs) shall, by 21 December 2023, conduct a geographical survey of the reach of electronic communications networks[31] capable of delivering broadband, and shall update it at least every three years thereafter. This geographical survey ('GS') 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 shall, after consulting stakeholders and in close cooperation with the EC and relevant national authorities, issue guidelines to assist NRAs and/or OCAs on the consistent implementation of their obligations under that Article.

During 2019, BEREC worked towards the phase one objective, issuing two questionnaires directed to identify NRAs' and OCAs' practices and views, organising a BEREC workshop open to OCAs and stakeholders (5 July) and organising with the EC two other workshops on the matter (21 May and 22 October).

At the second Plenary of the year, the BoR decided to issue the Guidelines in two phases. Phase one would provide the main Guideline elements (information to collect, means of collecting it and mandatory stakeholders), and phase two would deal with information verification methods and requirements, as well as the procedures to invite undertakings and public authorities to declare their intention to deploy VHCN in the relevant forecast period as per Article 22(3).

The draft BEREC Guidelines on Geographical Surveys (GSs) of network deployments (phase 1) were approved for public consultation on the 3 October at the 40th BEREC ordinary

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[31] ECN, as defined in Article 2.1 of the EECC.

meeting. 27 responses were received, including contributions by operators, OCAs and the general public.

The phase one Guidelines are designed in accordance with Article 22 of the EECC and intended to provide guidance to NRAs/OCAs on common approaches to develop GSs. NRAs/OCAs shall take utmost account of these Guidelines when developing these surveys. The Guidelines include some specific definitions to be considered when collecting and gathering the information. In addition, the Guidelines include a specification that the mandatory operators are those that are able to control any part of the access network. The Guidelines also deal with the types of information that NRAs/OCAs must obtain in order to characterise the reach and performance of broadband networks. Generally, this is QoS-1 information: calculated availabilities of service and calculated network performance information (as opposed to measurements of coverage or performance). The information required is a normalised structured set of the data detailed in the different Guideline subsections:

- For fixed broadband, the Guidelines distinguish the data requirements by the type of resolution approach chosen by the NRA/OCA: whether there is precision at the address level or grid/polygon level (100 x 100 m or smaller).

- For mobile broadband, the document presents a proposal for characterisation of the reach of the mobile broadband network based on 100 x 100 m grids (or a similar polygon).

The 'Data and characterisation of a GIS system' section provides information on these tools and the GIS layers relevant to these guidelines; the section 'Forecast specificities' provides a series of recommendations on the information to request for implementing surveys of forecasts of broadband reach that are relevant for the needs of the regulatory and policy functions referenced in Article 22. Finally, the last section offers guidance regarding the publication, confidentiality and aggregation of data for providing information to third-party users.

In 2020, BEREC will initiate the work regarding phase two, with public consultation planned for the third quarter of 2020, and final approval in the first Plenary of 2021

Document:

BoR (19) 182: Draft BEREC Guidelines to assist NRAs on the consistent application of geographical surveys of network deployments

Adoption of final Guidelines at Plenary 1 2020

2.1.10. Guidelines on the minimum criteria for a reference offer (obligation of transparency)

Following the provisions of Article 69 of the EECC, working with stakeholders and the Commission, BEREC was committed to issuing guidelines on the minimum criteria for a reference offer relating to the obligation of transparency by 21 December 2019. The Guidelines pursue the general objectives in Article 3 of the EECC.

In accordance with Article 69 of the EECC, the rationale for issuing guidelines on the minimum criteria for a reference offer is to contribute to a consistent application of transparency obligations. A requirement to publish a reference offer may in particular be appropriate where an undertaking has obligations of non-discrimination, the reference offer shall, in that respect,

be sufficiently unbundled to ensure that undertakings are not required to pay for facilities which are not necessary for the service requested. Given that BEREC's aim within the Guidelines should be to combine 'minimum criteria' and 'flexibility', the level of harmonisation for the Guidelines will permit a limited range of options (core elements for a reference offer), and specify the circumstances in which each will be appropriate.

The scope of the minimum criteria for a reference offer should cover any interconnection or access wholesale services regulated by NRAs, according to Articles 67 and 68 of the EECC and the Commission Recommendation on Relevant Product and Service Markets within the electronic communications sector susceptible to ex ante regulation. A reference offer shall contain a description of the relevant offerings for access, broken down into components according to market needs, and the associated terms and conditions, including prices. The reference offer shall also be sufficiently unbundled in order to ensure that undertakings are not required to pay for products, services or facilities which are not necessary for the service requested. As a result, the proposed minimum criteria set covers the following core elements:

- terms and conditions for the provision of network access;

- details of operational processes;

- service supply and quality conditions;

- general terms and conditions of the agreement.

BEREC emphasises that Article 69 relates to the SMP regime and that a reference offer should include all relevant terms and conditions etc.

To secure regulatory certainty, BEREC will conduct a workshop within the first year after adoption of the Guidelines to assess if there is a practical need and demand for reviewing and updating the Guidelines. Monitoring will be continued regularly based on an internal questionnaire sent to NRAs.

The draft Guidelines on the minimum criteria for a reference offer were approved for public consultation at the 39th BEREC Plenary Meeting. The public consultation ran from 19 June to 19 July 2019, and BEREC received ten comments from stakeholders. Close cooperation with the Commission was ensured. The Guidelines plus a report on the outcome of the public consultation were finally adopted at the 41st Plenary and published on 11 December 2019. The Guidelines shall be considered to be in effect following transposition of the EEEC into national law, and shall be applicable to market reviews conducted by NRAs following such transposition.

Documents:

BoR (19) 238: BEREC Guidelines on the minimum criteria for a reference offer

BoR (19) 237: BEREC Report on the outcome of the public consultation on the draft BEREC Guidelines on the minimum criteria for a reference offer

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2.1.11. Carry-over work on pricing for access to infrastructure & civil works

The Broadband Cost Reduction Directive (BCRD) aims to facilitate and incentivise the roll-out of high-speed electronic communications networks by promoting the joint use of existing physical infrastructure, and enabling a more efficient deployment of new physical infrastructure, so that such networks can be rolled out at a lower cost. The BRCD in particular contains rules on access to existing physical infrastructure (Article 3), coordination of civil works (Article 5) and access to in-building physical infrastructure (Article 9). In case the involved parties are not able to reach an agreement or access is refused, either party is entitled to refer the issue to the competent national dispute settlement body. Since determining pricing terms is one of the more complex issues addressed by the BCRD, it has been studied in more detail (see also BoR (17) 245 - Implementation of the Broadband Cost Reduction Directive, section 3.1.3).

The focus of this BEREC report is on pricing with regard to access to existing physical infrastructure (Article 3), as it is the most relevant Article for most Member States. Topics dealt with in the report are access to existing physical infrastructure (Article 3), including the relevance and effect of different (occasionally pre-existing) access regimes on BCRD pricing, pricing methodologies according to the BCRD regime and pricing decisions, coordination of civil works (Article 5) and in-building physical infrastructure (Article 9).

The aim of the report is to foster knowledge transfer between NRAs. The analysis is descriptive and does not aim to be normative or recommend best practice. It is based on replies to a questionnaire from NRAs of 24 Member States in which the relevant regulations regarding access to existing physical infrastructure and civil works have been transposed and are in place.

The report was approved for public consultation by the BoR at Plenary 3/2018. The public consultation ran from 10 October 2018 to 7 November 2018. In March 2019, following approval by the BoR at plenary 1/2019, BEREC published the final report and a report on the results of the public consultation.

Documents:

BoR (19) 22: BEREC Report on the outcome of the public consultation on the draft BEREC Report on pricing for access to infrastructure and civil works according to the BCRD

BoR (19) 23: BEREC Report on pricing for access to infrastructure and civil works according to the BCRD

2.1.12. Carry-over work on access to physical infrastructure in market analyses

Physical infrastructure represents a significant proportion of the investment in NGA networks. Measures aimed at facilitating greater use of existing physical infrastructure can reduce the civil engineering works required to deploy new networks and significantly lower costs.

NRAs have to date imposed access to physical infrastructure through existing wholesale markets (largely Market 3a), either as an ancillary remedy or by including physical infrastructure in the relevant market and imposing specific remedies. As evidenced by the responses to a BEREC questionnaire designed for this report, the majority of NRAs believe

that the existing list of relevant markets is currently sufficient to impose access to physical infrastructure where needed.

However, some NRAs have identified both current and prospective analytical and practical issues with this approach, which may become more prominent in years to come, particularly because of technological changes, increased infrastructure-based competition, development of offers of access to physical infrastructure from alternative operators or competition concerns that are wider than the ones currently identified by NRAs under the market review process. A market centred on access to physical infrastructure may offer a potential path to resolving these issues, depending on national circumstances.

A public consultation was organised on this report in 2019. The final version of the report, taking into account feedback received, was approved by the BoR and published in June 2019, together with a summary of the feedback obtained from the public consultation.

Document:

BoR (19) 94: BEREC Report on Access to physical infrastructure in the context of market analysis

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2.2 Monitoring potential bottlenecks in the distribution of digital services

2.2.1 Guidelines on intra-EU communications

Pursuant to Article 50 of the BEREC Regulation 2018/1971 which amends Regulation (EU) 2015/2120 of the European Parliament and of the Council of 25 November 2015 (TSM-Regulation), intra-EEA communication services are regulated, and BEREC shall publish guidelines on the parameters to be taken into account by NRAs in any sustainability assessment requested. The BEREC Guidelines for intra-EU communications are meant to clarify the provisions for regulating intra-EEA communications services, to ensure a common regulatory approach and assist in their consistent implementation.

Document:

BoR (19) 35: BEREC Guidelines on Intra-EU communications

2.2.2 Report on harmonised collection of data from Authorised Undertakings and OTTs

OTT services, like social media, instant messaging, videoconferencing and videostreaming, are of great value to consumers and businesses, and could also have an increasing competitive impact in the rapidly evolving electronic communications market. Yet their impact has never been quantified due to the absence of legal competences for NRAs to request information from providers of OTT services under the previous ECN/ECS Framework.

However, the EECC includes a new, broader definition of electronic communication services and provides the NRAs with the legal power needed to collect data from NI-ICS providers. Moreover, it also provides the legal basis to request data from services which are not electronic communication services or networks, providing these requests are substantiated and proportionate.

As these new data collection powers apply to all NRAs and OCAs, BEREC will take the opportunity of seeking a level of harmonisation on definitions of indicators, metrics and collection methods. This will facilitate NRAs' data collection and make it easier for companies to provide the data and allow international comparison.

Therefore, the BEREC report includes a list of possible indicators to request from these providers, under the new Framework. This is a 'preliminary list' to be updated in 2021 following discussions with the agents in the sector, which will enable BEREC to make a judgement on what is a proportionate request. Moreover, this industry-wide engagement is also needed to deliver on the definitions of the indicators. In 2020, BEREC will issue relevant questionnaires to stakeholders and organise a workshop on this subject. This work may be reflected in BEREC Guidelines and templates on the collection of data from OTT service providers to be considered for 2021.

Document:

BoR (19) 244: BEREC Preliminary report on the harmonised collection of data from both Authorised Undertakings and OTT operators

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2.2.3 Ex ante margin squeeze tests

Margin squeeze tests involve difficult judgements, particularly when regulated products are bundled with unregulated ones, and where there is a substantial difference in scale between access seekers and the incumbent. Sharing of experience among NRAs has been considered useful in this regard and was achieved by organising an internal workshop covering the concept of ex ante margin squeeze tests and case studies from NRAs.

The workshop discussed the concept of the ERT as set out in Recommendation 2013/466/EU, the BEREC Guidance document and the experience of NRAs in applying ex ante margin squeeze tests, i.e. the economic rationale of margin squeeze tests, the methodological choices to be made (such as the level of efficiency) and difficulties in practical implementation.

Document:

BoR (19) 239: Summary report for stakeholders on the internal workshop on ERT/margin squeeze tests applied by NRAs

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2.2.4 Carry-over work on the data economy

The role of data is becoming increasingly relevant in most sectors of the economy. The telecommunications sector is no exception, especially given its growing interactions with other

sectors which are at the core of data. Taking this into account, BEREC considers it important to study the impact of the data economy on the electronic communications sector, which is under its regulatory scope, and consider the role that NRAs could play in the context of the data economy.

With this in mind, BEREC held preparatory meetings with academics and stakeholders, including a workshop in June 2018, in which NRA heads and various relevant stakeholders took part. BEREC also prepared a call for input in the fourth quarter of 2018 to get insights from all types of stakeholders on issues to be taken into account by NRAs in the context of the data economy, and ideas on how the experience of NRAs can be used, in collaboration with other regulatory bodies, to encourage the development of the data economy. BEREC subsequently published a report on this topic in June 2019.

Document:

BoR (19) 106: BEREC report on the Data Economy

2.2.5 Report on Internet of Things indicators

The Internet of Things ('IoT') is an important phenomenon that affects the lives of European citizens in many respects. BEREC first considered the implications of IoT in 2016 when the 'Enabling the Internet of Things' report described this and assessed whether IoT services require special treatment with regard to current and future development.

In the 'Internet of Things Indicators' report, BEREC scopes the need for and possibility of conducting a harmonised data-gathering exercise so as to improve current information on the IoT in Europe. The report conducts an assessment of the type(s) of data that NRAs are collecting and reflects on their needs, as well as considering the views of stakeholders who participated in a public consultation from 12 December 2018 to 23 January 2019.

The report looks at legal possibilities for NRAs to collect data from providers according to the new EECC and concludes that, in accordance with the principle of technology neutrality, any service that consists of the transmission, or wholly or mainly of the conveyance, of signals between devices or software-based applications (with limited or no human interaction) supplied for remuneration, must be considered an ECS and may be subject to information requests. Thus, the EECC gives added powers to NRAs and BEREC to collect data on M2M, in so far as it enables an ECS to be considered an M2M. However, the EECC first needs to be transposed into the different national legislations.

The report also concludes that the main purpose of data collection should be to inform NRAs and BEREC on regulatory policy, in order to ensure the adequate level of connectivity so that the IoT can be successfully deployed. Moreover, to understand if and how these services may affect competition in the provision of electronic communication networks ('ECN') and services ('ECS'). The report also provides a set of indicators to collect, related to connectivity, in line with what is proportional and feasible.

Finally, the report suggests that BEREC will commission a third-party study, prior to the deadline for the directive's transposition into national law, to identify the providers of the

different M2M services, and whether and how they can provide information, and move forward with a first attempt to collect data.

Document:

BoR (19) 25: BEREC Report on Internet of Things indicators

2.3 Enabling 5G and promoting innovation in network technologies

2.3.1. The impact of 5G on regulation

The development of the 5G ecosystem already involves many aspects of regulation. How it develops as take-up increases and service propositions emerge has the potential to affect regulation further. How regulatory impacts are addressed could affect the pace at which innovative services are brought to market and the full market and consumer benefits of this new technology are realised.

BEREC was tasked with developing a report to help NRAs for electronic communications anticipate where and how 5G deployment may impact on the regulatory environment. The work sought to build on the insights of the DotEcon/Axon Study on the implications of 5G Deployment on Future Business Models.

Essentially, the BEREC approach was not to attempt to identify specific problems today, nor to come up with solutions. Instead, it sought to undertake a 'horizon scanning exercise' and pose a range of questions, such as how services might be rolled out, how markets might develop and how these might pose new regulatory challenges for NRAs. New regulatory challenges do not mean more regulation per se, but could mean less or more proportionate regulation, depending on the issue at hand.

The group sought to involve stakeholders from an early stage to enable BEREC to learn from them how 5G and its roll-out might raise potential issues in the future. This was done through a Call for Input (CFI) issued in August 2019. The CFI took an expansive approach to seek views on the impact of 5G on regulation and what stakeholders might consider to be the role of regulation in enabling the 5G ecosystem.

The CFI posed a series of questions on a variety of topics ranging from privacy and security, competition and potential competition bottlenecks, and on more technical issues such as network slicing, numbering in an IoT/M2M world, and interoperability of technologies and networks. The questions were also accompanied with suggested examples of how issues might arise in a 5G context. Based on these examples, stakeholders were asked for their views on work which might be taken forward in the future.

BEREC received a very good response from stakeholders to its CFI. There were more than 40 replies from a variety of sectors, including network operators, service providers, manufacturers, application providers, industry and consumer representative organisations, and research and advisory bodies.

Overall, and given the current state of play of commercial 5G deployments, BEREC is confident that NRAs and BEREC are thinking about the right things (for example, authorising rights of use to spectrum in suitable ways to satisfy various connectivity demands, and addressing perceived uncertainty in the BEREC Guidelines on Open Internet). Some of the issues raised are currently being looked at in other BEREC WGs, either as part of ongoing activities or likely to take place during 2020-21.

BEREC also received a few stakeholder comments that are not within BEREC's remit to deal with, but which are likely to be addressed by OCAs, either now or in the future. For example, studies on emission levels of electromagnetic radio frequencies (EMF) or development of a toolkit for dealing with network security issues.

Furthermore, BEREC is aware that not all the concerns and issues received can be addressed at the present time, because it is not yet clear how these potential issues would develop. For example, BEREC consulted on a feasibility study on the development of coverage information for 5G deployments, but the preliminary views of stakeholders in an early call for input during 2019 on the project seemed to indicate that it would be too early for BEREC or NRAs to take definitive steps to progress this project at this time. Therefore, BEREC proposes adopting a watching brief, and taking action when the impact of these issues becomes clear, in order to enable the 5G ecosystem.

Document:

BoR (19) 191: BEREC feasibility study on development of coverage information for 5G deployments

Adoption of final report at Plenary 1 2020

BoR (19) 245: BEREC Report on the impact of 5G on regulation and the role of regulation in enabling the 5G ecosystem

Adoption of final report at Plenary 2 2020

2.3.2. Peer review process

The working arrangement between BEREC and RSPG was signed on 13 June 2019. BEREC and RSPG set out a number of cooperation methods for the purpose of participation in the Peer Review Forum, stipulated in Article 35 of the EECC, which shall become applicable on 21 December 2020:

- to use the Peer Review Forum as an instrument of peer learning;

- to promote the view that the Peer Review Forum brings significant benefit as it convenes national NRAs and OCAs with expertise on comparative or competitive selection procedures pursuant to the electronic communications regulatory framework;

- to cooperate on the implementation of the Peer Review Forum;

- to appoint 'liaison officers' in both BEREC and RSPG to strengthen the relationship between the two bodies as well as to facilitate the implementation of this Arrangement.

In relation to the last bullet point above, BEREC's 'liaison officers' welcomed the approach to have a more structured exchange with RSPG as the Peer Review forum is open to voluntary participation by experts from BEREC. To date, experts have participated in the Peer Review convened by RSPG on ARCEP's proposed 3.4-3.8 GHz award in France (Paris, September 2019).

In addition, and based on the principle of strengthening cooperation between the bodies, BEREC and RSPG held a joint workshop to discuss ongoing award processes for various 5G bands (Brussels, October 2019). BEREC intends to continue to participate in the Peer Review process and to engage in dialogue with RSPG on regulatory issues of mutual interest during 2020.

2.3.3. Carry-over work on the Common Position on infrastructure sharing

In June 2019, BEREC adopted a Common Position on infrastructure sharing. This Common Position describes criteria which can be taken into account by NRAs in assessing mobile infrastructure sharing agreements, where NRAs have competence to do so.

The document provides background information relevant to the consideration of infrastructure sharing agreements which do not (on their own) constitute a Common Position. This includes information on relevant legal frameworks relating to the treatment of infrastructure sharing agreements, and information on the potential benefits and drawbacks of infrastructure sharing agreements.

The Common Position itself consists of:

- common definitions of different infrastructure sharing types: passive sharing, co-location, site sharing, mast sharing, active sharing, RAN sharing, MORAN sharing, MOCN sharing, frequency (or spectrum) pooling, national/local roaming, core network sharing and backhaul sharing;

- common important objectives which NRAs should consider when assessing infrastructure sharing agreements (providing that it is within their competence to do so): effective competition, better connectivity and efficient use of spectrum;

- common factors which NRAs should consider when assessing infrastructure sharing agreements (providing that it is within their competence to do so): competitive market forces evolution, the feasible level of competition, type of sharing, shared information between the sharing parties and its impact on their ability to compete, reversibility and contractual implementation.

It should be noted that consideration of these factors, their relative importance to one another, and the relevance of potentially significant other factors not listed here are likely to be highly context specific. In all instances, therefore, assessing infrastructure sharing agreements will require evidence-based analysis on a case-by-case basis.

Document :

BoR (19) 109: BEREC report on the outcomes of the public consultation on the draft BEREC Common Position on mobile infrastructure sharing

BoR (19) 110: BEREC Common Position on mobile infrastructure sharing

2.3.4. BEREC work in light of European Commission 5G Cybersecurity Recommendation

On 26 March 2019, after receiving support from the European Council, the European Commission adopted the Commission Recommendation on Cybersecurity of 5G networks[32].

The Recommendation identified a number of concrete actions, which will support the development of a Union approach to ensuring the cybersecurity of 5G networks. In particular, it initially requested each Member State to carry out a national risk assessment of the 5G network infrastructure. At a second stage, it requested the dissemination of a Union coordinated risk assessment by the NIS Cooperation Group, which is one of the main actors in its implementation. In order to achieve all of the above, and as explicitly stated in the Recommendation (preamble, para.24 and Chapter. V, point 6), the Cooperation Group should draw on the support of ENISA, Europol, BEREC and the EU Intelligence and Situation Centre.

BEREC's role, in this context, included acting as a conduit for information and experience sharing on electronic communications market matters among its Members and participants and other relevant bodies, and to assist the toolbox development process as mandated in Preamble 24 of the Recommendation. After consulting with the NIS Cooperation Group, ENISA and the Commission, BEREC proceeded to prepare an internal Survey on the state of play concerning the different security requirements for electronic communications networks and related issues in the European Countries for 3G, 4G and 5G networks. Apart from EU Member States, Norway, Albania and Turkey also participated in the Survey, leading to responses received from 29 countries.

The Survey is a snapshot in time, to inform the processes set out in the Recommendation, and does not intend to portray the complete picture of the 5G situation across the EU, given:

- that Member States and countries are at different stages in the roll-out of 5G networks;
- that Member States and countries are have yet to implement the EECC; and
- the dynamic nature of the 5G technological development, as the standards themselves have yet to be finalised.

From the responses received to the Survey, BEREC has been able to construct a picture of how the electronic communications ecosystem in Europe perceives and addresses some of the challenges brought about by the security of 5G networks, including the new legal obligations.

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[32] (EU) 209/534 of 26 March 2019:
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019H0534

The document produced was BoR (19) 218 with the title "Internal Survey on the state of play for security requirements in 3G, 4G and 5G Electronic Communications Networks in Europe" and was adopted by BEREC on 30 October 2019 and immediately submitted to the NIS Cooperation Group. A second action taken by BEREC in the context of the Commission Recommendation was the organization of an Internal Stakeholder Workshop in Brussels on 27 November 2019.

The purpose of the Workshop was to have an early engagement with stakeholders, allowing them to provide input on the outcome of the EU risk assessment on 5G cybersecurity and on possible measures to address the identified risks to network security and cybersecurity in 5G networks as well as to hear stakeholder views regarding the present market evolvement.

The stakeholders involved apart from DG Connect, the NIS Cooperation Group Members and ENISA, were GSMA, GSA, ECTA and ETNO. A lot of valuable input was provided by the attending stakeholders, including proposals for further information exchange among Member States and between Member States and industry. Most of them are listed in the last part of a report that was approved for internal use in Plenary 1 2020.

Documents:

BoR (19) 218: Internal Survey on the state of play for security requirements in 3G, 4G and 5G Electronic Communications Networks in Europe
Adoption as an internal document on 30 October 2019

BoR (20) 48: Internal Stakeholder Workshop Draft Report

Adoption at Plenary 1 2020

2.4 Fostering a consistent approach of the net neutrality principles

2.4.1 Update to the Guidelines on Net Neutrality

Following the 2018 BEREC Opinion on the Open internet Regulation[33], BEREC held a public workshop for stakeholders in May 2019 and adopted the draft updated version of the Open Internet Guidelines for public consultation in October 2019. In the consultation document, the most important proposed changes are highlighted[34]. 51 respondents filed contributions to the consultation. BEREC is expected to publish a final version of the Guidelines in June 2020.

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[33]   https://berec.europa.eu/eng/document_register/subject_matter/berec/opinions/8317-berec-opinion-for-the-evaluation-of-the-application-of-regulation-eu-20152120-and-the-berec-net-neutrality-guidelines
[34]   https://berec.europa.eu/eng/document_register/subject_matter/berec/public_consultations/8849-public-consultation-on-the-draft-berec-guidelines-on-the-implementation-of-the-open-internet-regulation

> **Document:**
>
> BoR (19) 179: Draft BEREC Open Internet Guidelines
>
> Adoption of final Guidelines at Plenary 2 2020

2.4.2 Report on the implementation of Regulation (EU) 2015/2120 and BEREC Net Neutrality Guidelines

In 2019, BEREC published its third 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 in the course of implementing the open internet provisions of Regulation (EU) 2015/2120 and the associated BEREC Net Neutrality Guidelines. This report reflects the third year of the Regulation's application, covering the period from 1 May 2018 to 30 April 2019. BEREC has gathered information from 29 NRAs via an internal questionnaire.

The report shows that quite a few NRAs have dealt with zero-rating and traffic management cases, and a handful of formal decisions were reached. Zero-rating offers were identified by almost all (28) NRAs, with music/video streaming and social networking the most frequently mentioned types of applications being zero-rated. Traffic management practices were assessed formally by more than half of the NRAs, compared with only a small number in the previous reporting period. According to most NRAs, monitoring activities have become an on-going activity, and interaction with the ISPs is now entering a more mature phase.

Although IPSs have included speed information in their contracts in three out of four countries, in most cases their definitions are still rather vague and unclear. The majority of NRAs monitor end-user complaints regarding the performance of the IAS. Two thirds of NRAs (19 out of 29) offer an IAS quality monitoring mechanism to consumers.

In terms of the application of Article 5 of the Regulation, the report concludes that a large majority of NRAs have monitored the availability of high-speed internet access services, with the most popular approaches being either through information requests from ISPs or through analysis of complaints and end-user reporting.

> **Document:**
>
> BoR (19) 177: BEREC Report on the implementation of Regulation (EU) 2015/2120 and BEREC Net Neutrality Guidelines

2.4.3 Carry-over work on the BEREC Net Neutrality measurement tool

In 2018, BEREC ran a procurement process for a net neutrality measurement tool. Since the end of 2018, the project has been ongoing, and BEREC has continued to provide for the follow-up and supervision of the development of the net neutrality measurement tool, performed by the contractor selected. The development of the tool was completed by the end of 2019. It will be followed by a three-year maintenance phase. BEREC will engage in multi-NRA coordination of the application of the tool by NRAs in 2020.

2.5 Exploring new ways to boost consumer empowerment

2.5.1 Guidelines on general authorisation notifications transmitted to competent authorities

Pursuant to Article 12(4) of the EECC, 'in order to approximate notification requirements' and harmonise the notification forms currently in use at national level accordingly, BEREC was called upon to publish guidelines for the notification template, i.e. guidelines outlining the main features and contents of the notification form, within the constraints of Article 12(4), to be taken into account by Member States that envisage a notification requirement.

BEREC worked on this item throughout 2019, and, following public consultation in the summer on a draft containing a notification template (streamlining and standardising notification fulfilments for operators), further suggestions were incorporated in the text in order to simplify notification-related fulfilments. The final Guidelines were adopted in December 2019, according to schedule.

Document :

BoR (19) 259: BEREC Guidelines for the notification template pursuant to Article 12, paragraph 4 of Directive 2018/1972 of the European Parliament and of the Council

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2.5.2 Guidelines on common criteria for undertakings other than ECN/ECS[35] to manage numbering resources

Pursuant to Article 93(2) of the EECC, by 21 June 2020 BEREC shall adopt, after consulting stakeholders and in close cooperation with the Commission, guidelines on common criteria for the assessment of the ability to manage numbering resources, and of the risk of exhaustion of numbering resources.

Back in 2018 and throughout 2019, BEREC worked intensively on the identification of criteria to guide NRAs in the assignment – when envisaged by the individual Member State – of numbering resources to entities that do not qualify as electronic communication network or service providers. During the summer of 2019, a public consultation was conducted, where no relevant input was collected on significant use cases. In line with the Work Programme 2020, BEREC finalised its Guidelines in March 2020.

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[35] ECN: Electronic Communication Networks; ECS: Electronic Comm   unication Services

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Document :

BoR (19) 114: Draft 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

Adoption of final Guidelines at Plenary 1 2020

2.5.3 Input to EC regarding contract summary template

Directive (EU) 2018/1972[36] (the EECC) mandates the European Commission to adopt, after consulting BEREC, implementing acts specifying a contract summary template to be used by the providers of publicly available electronic communications services other than transmission services used for the provision of machine-to-machine services.

On 3 April 2019, the Commission requested input from BEREC on the contract summary template. The main elements of the template include aspects such as the provider's identification, contract information and characteristics, the characteristics of the service, the prices, the duration of the contract, the extent to which the products and services are designed for end-users with disabilities and information to be provided about internet access services. BEREC was requested to provide input by 31 May 2019. Input was provided and published (BoR (19) 81) that set out BEREC's view on the following aspects of the contract template: main elements of the template, hyperlinking and pop-ups, bundles and corporate visual identity and behavioural insights.

In August, the Commission published a consultation for feedback on two documents, i) the draft Commission Implementing Regulation (EU) establishing a template for the contract summary to be used by providers of publicly available electronic communications services pursuant to Article 102(3) of Directive (EU) 2018/1972 of the European Parliament and of the Council, and ii) a draft Annex to the Commission Implementing Regulation. BEREC provided and published its input to the draft Commission Implementing Regulation in BoR (19) 163.

Document :

BoR (19) 81: BEREC Input for the contract summary template, Article 102(3) of the EECC

BoR 19) 163: BEREC response to the Commission's public consultation on the contract summary template for electronic communications service providers

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2.5.4 Guidelines detailing quality of service parameters

In accordance with Article 104 EECC, by 21 June 2020, in order to contribute to a consistent application of the Article and of Annex X, BEREC shall, after consulting stakeholders and in close cooperation with the Commission, adopt guidelines detailing the relevant Quality of

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[36] Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code.

Service (QoS) parameters, including parameters relevant for end-users with disabilities, the applicable measurement methods, the content and format of publication of the information, and the quality certification mechanisms.

EU EWG presented a scoping document BoR (19) 102 to the Board to share the proposed approach and in October, following approval, published a consultation seeking views on the Guidelines as set out in BoR (19) 189. The consultation period extended from 10 October to 5 December 2019, and 11 responses were received. In general, stakeholders welcomed the opportunity to comment on the Guidelines. Taking into consideration comments received, a summary response document and final guidelines will be published in Q1 2020. The Guidelines set out QoS definitions and measures in accordance with the legal basis in Annex X of the EECC, and in addition measures for end-users with disabilities, and consumer complaints. Reference to ETSI standards are used where applicable, in addition to referencing to work undertaken by BEREC in its Net Neutrality Regulatory Assessment Methodology Report (BoR (17) 178).

Document:

BoR (19) 189: BEREC Guidelines detailing Quality of Service Parameters

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2.5.5 Report on Member States' best practices to support the defining of adequate broadband internet access service

The report is a requirement under Article 84(3) of the 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'. Upon the transposition of Article 84 of the EECC, Member States shall, in light of national conditions and the minimum bandwidth enjoyed by the majority of consumers within their territory, and taking into account the BEREC report on best practices, define the adequate broadband internet access service for their territories with a view to ensuring the bandwidth necessary for social and economic participation in society. The adequate broadband internet access service shall be capable of delivering the bandwidth necessary for supporting at least the minimum set of services set out in Annex V of the EECC.

In the light of the above, the report describes the relevant experiences that may inform the definition of the adequate broadband universal service obligation by Member States according to the EECC, and then 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 to date 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 the 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 that

have introduced a broadband universal service obligation. In identifying common principles and detailing how the nine Member States have to date introduced a broadband universal service obligation, the report aims to contribute towards the consistent application of Article 84 by Member States in the introduction of adequate broadband internet access service under universal service.

The report has been drafted in close cooperation with the European Commission, in particular with regard to the data sources referenced in the report. The report was approved for public consultation by the BoR at Plenary 4/2019. The public consultation ran from 11 December 2019 to 27 January 2020. The final report and consultation report will be published after Plenary 2/2020.

> **Document:**
>
> BoR (19) 260: BEREC report on Member States' best practices to support the defining of adequate broadband internet access service

2.5.6 Workshop to move towards a vision for Europe's telecoms consumers

On 12 June 2019, the day before the second Plenary meeting of 2019, BEREC held a joint workshop with BEUC, the European Consumer Organisation on 'Understanding consumer vision and perspectives in respect to Europe's telecoms'. The workshop was organised as part of one of BEREC five strategic priorities in its Strategy 2018-2020, 'Exploring new ways to boost consumer empowerment'. The aim of the workshop was to help BEREC to better identify any specific actions it might take to further empower consumers, whether in the short term or in future work programmes, and, if appropriate, to update BEREC's Medium Term Strategy.

The workshop was addressed to regulators and to BEUC associates. It included presentations from independent speakers (from academia, relevant institutes and BEUC), and was followed by a panel discussion on possible improvements to consumer protection rules and on their implementation. BEREC produced a Summary report on the workshop which was approved for publication on 3 October 2019.

> **Document:**
>
> BoR (19) 194: BEREC Summary report on the workshop to move towards a vision for Europe's telecoms consumers

2.5.7 Guidelines on how to assess the effectiveness of public warning systems transmitted by alternative means to mobile NB-ICS

These guidelines are provided by BEREC in response to the task set in Article 110(2) of Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the EECC to assist Member States in assessing the effectiveness of

alternative Public Warning Systems using means of electronic communications services (ECS-PWS). On 11 December 2019, BEREC submitted the draft guidelines for public consultation. The consultation ran from 11 December 2019 to 31 January 2020. Stakeholders were invited, in particular, to answer the following questions related to the minimum operational requirements a public warning system should be able to fulfil, in their opinion:

1. What are the minimum operational requirements of your public warning system operator with regard to the criteria of coverage and capacity to reach end-users? In particular, what are your expectations with regard to targeting concerned end-users in a specific geographical area (required minimum geographical granularity)?

2. In your experience, how many (percentage) of the overall events that trigger a PWS-message can be assigned to each of the following alert-levels with regard to the size of the targeted area:

    i.   population up to 5,000;

    ii.   population up to 50,000;

    iii. population up to 500,000;

    iv.   population up to 2 million;

    v.   population above 10 million?

3. If your Member State has already rolled out an ECS-PWS, how well does it meet your expectations in in terms of geographical coverage, population coverage and overall capacity to reach end-users?

In 2020, BEREC will finalise Guidelines on how to assess the effectiveness of public warning systems transmitted by different means.

Document:

BoR (19) 255: BEREC Guidelines on how to assess the effectiveness of public warning systems transmitted by different means

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2.5.8 Workshop on the use of E.164 numbers in cross-border fraud and misuse

The workshop was a continuation of previous work undertaken by BEREC with respect to fraud and misuse of numbers (BoR (13) 37 'Article 28(2) USD Universal Service Directive: A harmonised BEREC cooperation process. BEREC Guidance Paper' and BoR (16) 226 'Report on a review of the cross-border regulatory cooperation process within the scope of Article 28(2) of the Universal Service Directive').

In June 2019, a questionnaire was circulated to all BEREC member countries. The questionnaire was aimed at investigating how NRAs currently manage with abuses of the E.164 number range, and how related issues could be discussed at a workshop. BEREC held

the workshop on 8 October 2019, where the issue was discussed by a representative of Europol, CLI Fraud, in addition to the NRAs ComReg and EETT.

The panel discussion focused on how cooperation between NRAs can be improved, and how NRAs and outside organisations such as Europol can assist each other in the management and enforcement of powers where necessary, to minimise the fraud and misuse of the numbers. This matter is set out in 'Numbering-related BEREC tasks' section 6.2 of the Work Programme 2020 (BoR (19) 253), which states 'BEREC will further cooperate on matters of fraud and misuse of numbering resources, by following up on the experience on implementing Article 28.2 USD (Article 97.2 EECC).'

> **Document:**
>
> BoR (19) 241: BEREC Summary report on the outcomes of an internal workshop on the use of E.164 numbers in cross-border fraud and misuse

2.5.9 Carry-over work on termination of contracts and switching providers

In December 2018, BEREC published a draft report - BoR (18) 229 - on terminating contracts and switching providers, which built on its previous 'BEREC report on best practices to facilitate consumer switching' (BoR (10) 34 Rev1), published in 2010.

The aim of the report was to investigate strategies adopted by operators to erect barriers to switching (such as switching costs) and financial barriers or penalties for leaving contracts, both of which may discourage consumers from switching providers to obtain a better contract. A better understanding of those barriers can aid NRAs and Member States in their aims to protect consumers and, at the same time, facilitate a competitive environment.

The report collates information on the approaches to switching across different communications services. It discusses the processes used in MS, and the applicable rules in each MS to ensure that there are robust safeguards and adequate protection for consumers against any failures or drawbacks within the switching process.

The draft BEREC report was subject to public consultation between 12 December 2018 and 18 January 2019. The final report, which carefully considered the 14 submissions received from the stakeholders in response to the public consultation, was approved in early 2019.

> **Document:**
>
> BoR (19) 27: BEREC Report on Terminating Contracts and Switching Providers

2.5.10 Input to European Commission methodology on pricing of bundles

During the third ordinary meeting of the BoR in 2018, BEREC approved the report entitled 'European Benchmark of the pricing of bundles – methodology guideline'. This report

suggested a new methodology that the EC should consider in providing its Broadband Pricing Reports. Up to now, the EC has been publishing separate, fixed and mobile broadband pricing reports; BEREC considered that those did not properly address the situation in several European countries where mobile and fixed broadband services are bundled in one offer. The report suggested amendments to the existing EC methodologies, and a new approach to comparing retail bundle prices, including convergent bundles and prices for typical household consumption.

In 2019 the EC commissioned the works that are needed to provide for its new broadband reports, which will consider the BEREC methodology. To do this, the contractor has sought feedback from NRAs and BEREC on the baskets to consider and on several methodological issues. In September 2019 a meeting was held between the BEREC members and the contractor to discuss those issues.

2.6 BEREC obligatory work and engagement with stakeholders

European Electronic Communications Code

2.6.1 Ad hoc input to the European Union institutions/NRAs

In 2019, BEREC has ensured support to NRAs in the implementation phase of the Code, by having the RF WG serve as a forum for exchanging views on national transposition formulas and submitting relevant questions for reflection.

2.6.2 Implementation of the BEREC Regulation

In 2019, BEREC carried out the following tasks, entrusted to it by the new BEREC Regulation, which are tightly connected to its proper functioning:

1. Pursuant to Article 10(1)(h) of the new BEREC Regulation, in April 2019, BEREC adopted and made public its new rules of procedure, both for the Board of Regulators and the Management Board, thereby updating their previous version dating back to 2014.

2. Pursuant to Article 14(4) of the new BEREC Regulation, BEREC also adopted last July rules of procedure laying down the practical arrangements for the operation of its Working Groups.

3. Pursuant to Article 37(2), the Board of Regulators and the Management Board also adopted in June 2019 the detailed rules for applying Regulation (EC) No 1049/2001 regarding public access to documents.

4. In September 2019, pursuant to Article 37(4) of the new BEREC Regulation, after consultation of the European Data Protection Supervisor, BEREC adopted implementing rules on data protection for both the Board of Regulators and the Management Board, in line with Regulation (EC) No 45/2001.

Document:

BoR (19) 58: BEREC Board of Regulators Rules of Procedure

BoR (19) 143: BEREC Rules of Procedure on the operation of BEREC Working Groups

2.6.3 Database of E.164 numbers of European emergency services

Pursuant to Article 109(8) of the EECC, 'BEREC shall maintain a database of E.164 numbers of Member State emergency services to ensure that they are able to contact each other from one Member State to another, if such a database is not maintained by another organisation'.

As a consequence, in 2019 BEREC promoted exchanges with the CEPT/ECO, with a view to assessing whether the existing database - the Public Safety Answering Point Directory (PSAP-DIR) - currently maintained by the CEPT/ECO, operational since 1 December 2018 and covering contact information for 18 PSAPs in 14 European countries, could be considered in line with the legal requirements in the EECC. BEREC collected relevant information and carried out its own analysis, drawing the conclusion that the database managed by ECO of CEPT meets the requirements as in Article 109(8) of the EECC.

The relevant suitability assessment was shared at the Board of Regulators' meeting in October, accompanied by the suggestion for some follow-up initiatives for 2020, with a view to further populating the database.

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

According to Article 93(4) 'each Member State shall ensure that national regulatory or other competent authorities make available a range of non-geographic numbers which may be used for the provision of electronic communications services other than interpersonal communications services, throughout the territory of the Union, without prejudice to Regulation (EU) No 531/2012 and Article 97(2) of this Directive. Where rights of use for numbering resources have been granted in accordance with paragraph 2 of this Article to undertakings other than providers of electronic communications networks or services, this paragraph shall apply to the specific services for the provision of which the rights of use have been granted.'

Throughout 2019 BEREC has been working on the establishment of the database, with its completion scheduled for the end of 2020.

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

Article 75 of the EECC establishes that by 31 December 2020 the EC shall, taking utmost account of the opinion of BEREC, adopt a delegated act setting a single maximum EU-wide mobile voice termination rate and a single maximum EU-wide fixed voice termination rate. These will be imposed on any operator active on each of the markets of mobile voice termination and fixed voice termination respectively in any Member State.

On the 26 July, the EC published a public consultation, with the objective of gathering stakeholders' views regarding various implementation aspects of Union-wide fixed and mobile voice call termination rates, in particular the scope of application and exceptional circumstances.

The BEREC response to the public consultation was approved by the BoR in November 2019. In it, BEREC suggested defining wholesale voice call termination services thus: 'Wholesale fixed (mobile) voice call termination is the service required in order to terminate calls to end-users' fixed (mobile) telephony numbers.'

BEREC also provided its opinion on other matters. These include consideration of a transitional period of up to 12 months to allow adjustments in Member States where this is necessary to ensure a smooth transition from pre-existing termination rates to the Eurorates; the circumstances that could justify a glide-path towards the estimated level of efficient cost; the treatment of hybrid services; consideration of calls originated outside the EEA, and other obligations to be imposed on providers of call termination services (rather than price controls).

Document:

Adoption of final Opinion at Plenary 3 2020

Roaming

2.6.6 BEREC input on the weighted average of maximum mobile termination rates across the EU

According to Article 6e(2) of the 2012 Roaming Regulation, as amended, the Commission must review the Implementing Acts annually, after having consulted with BEREC, setting out the weighted average of the maximum mobile termination rates (MTRs). BEREC provided input to the Commission on the weighted average of the maximum MTRs on 9 October 2019.

Document:

BoR (19) 190: BEREC input on weighted average of maximum mobile termination rates

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2.6.7 International Roaming benchmark data report

According to Article 19 of the 2012 Roaming Regulation, BEREC must regularly monitor the retail and wholesale roaming prices for voice, SMS and data services, as well as the volume and revenues generated by mobile operators across Member States. Moreover, because of the amendments to Article 19, BEREC must report regularly on the development of pricing and consumption patterns in 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 the 22nd benchmark report in June 2019 and the 23rd benchmark report in October 2019

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Document:

BoR (19) 21: International Roaming benchmark data report April 2018-September 2018

BoR (19) 174: International Roaming benchmark data report October 2018-March 2019

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2.6.8 Transparency and comparability of international roaming tariffs

Pursuant to Article 19 of the 2012 Roaming Regulation, BEREC is responsible for regularly monitoring the transparency and comparability of roaming tariffs, and must present the findings in an annual report. The objective of the report is to monitor and increase consumer awareness of the variety of roaming tariffs, and to increase transparent market conditions and the ability of customers to make well-informed decisions. The report addresses key questions on whether information on price and tariff conditions are made available in a clear and convenient way, and whether consumers are able to compare those tariffs.

Operators and regulators were asked several questions relating to these two key issues in August 2019. BEREC published its seventh BEREC report on the transparency and comparability of tariffs in December 2019. 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 focused on information about the complaints on transparency issues that NRAs received between July 2018 and July 2019. The questionnaire for operators focused on obtaining information about the structure of tariffs for international roaming, the structure of alternative tariffs and the tariffs without roaming.

In addition, questions regarding the information provided by operators in general for roaming and the available prices comparison tools for international roaming were addressed to operators. The report shows that, during the period August 2018 and August 2019, 10 NRAs received applications for sustainability surcharges, with a total amount of 30 applications. Of these applications, 24 were granted and 6 were pending at the time of submitting the questionnaire.

<div style="border:1px solid black">

Document:

BoR (19) 235: BEREC Report on Transparency and Comparability of International Roaming Tariffs

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Quality and efficiency

2.6.9 Termination Rates at the European level

BEREC constantly monitors domestic[37] fixed and mobile termination rates in Europe and provides an overview report twice a year. Following interventions by NRAs in the two relevant

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

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 TRs (Recommendation 2009/396/EC), the wholesale rates both for mobile and fixed interconnection have fallen significantly, and continue to decrease.

In July 2019, the simple European average of the lowest national regulated fixed termination rates (only EU Member States) stood at 0.1920 EUR cents per minute. MTRs have been regulated based on cost-oriented pricing in all EU28 countries since the beginning of the decade. Most NRAs have implemented the Commission Recommendation on TRs, which established pure long-run incremental cost (LRIC) as the cost standard to be applied to the interconnection service for voice calls in mobile networks at the wholesale level. The European average of mobile wholesale termination rates has fallen substantially between July 2005 and July 2019: the simple average A(s) from 12.3 to 0.88 cents per minute, the weighted average A(w) from 13.2 to 0.78 cents per minute[38].

Document:

BoR (19) 91: BEREC Report on Termination Rates at the European level, January 2019

BoR (19) 243Rev.1: BEREC Report on Termination Rates at the European level, July 2019

2.6.10 Article 7/7A Phase II process

The procedures defined in Article 7/7a of the amended Framework Directive constitute one of the principal innovative features of the 2009 package. Since its first full year of operation, 2011, BEREC has continued to respond successfully and efficiently to Article 7/7a Phase II cases

In 2019, the handling of Article 7/7a Phase II procedures remained an important part of BEREC's work. During 2019, the European Commission opened four Article 7/7a Phase II cases, compared with three cases in 2018 and eight cases in 2017; however, BEREC only issued one Opinion regarding case PL/2019/2156 (see detail below). For the other two cases, BEREC issued its opinion in January 2020 for case SE/2019/2216; and for case(s) DE/2019/2153-2154, the NRA (BNetzA) withdrew its notifications on 29 April 2019.

All the cases are outlined below:

A. Case DE/2019/2153-2154 – Germany

Market	Wholesale call termination on individual public telephone network provided at a fixed location in Germany (Market 1)
Description	Phase II was opened under Article 7a of the Framework Directive on 15 April 2019.
Outcome	BNetzA withdrew its notifications on 29 April 2019; there was no need to establish a BEREC EWG.

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[38] In the BEREC periodic MTRs benchmarks, both a simple average and a weighted average are reported. The latter is calculated by weighting each country's average with the relative share of the country's subscribers (compared with all subscribers).

Document	No BEREC Opinion was issued.

B. Case PL/2019/2156 – Poland

Markets	Wholesale call termination on individual public telephone networks provided at a fixed location in Poland (Market 1)
Description	Phase II was opened under Article 7a on 26 April 2019.
	The BEREC Opinion was adopted on 10 June 2019 and published on 11 June.
	BEREC considered that the Commission's serious doubts were justified.
	BEREC was of the opinion that UKE should comply with the provisions in the TRR as soon as possible, by setting the appropriate FTRs at a symmetric, cost-efficient level. Moreover, in light of the Commission's serious doubts and the argumentation above, BEREC considered that, for the intermediate period, UKE should set the FTRs by using a European benchmark of the FTRs determined based on pure BU-LRIC methodology.
	BEREC recommended that the Polish NRA should make publicly available, without undue delay, a schedule of timelines on the adoption of the BU-LRIC-based regulated FTRs.
Outcome	EC issued a Recommendation on 26 August 2019 that UKE should amend or withdraw the notified draft measure, in order to ensure that the evaluation of the efficient costs for the rates applied on the fixed termination markets in Poland is based on a pure BU-LRIC methodology, as the most appropriate methodology for the regulation of the rates applicable in the fixed termination markets.
	UKE should implement new FTRs based on the pure BU LRIC cost model, specifying detailed and binding timeline for the development and finalisation of the pure BU LRIC model, including introduction of the new rates based on its results.
	Until such time (in the interim period), UKE should set the FTRs by reference to the benchmark of average FTRs costs, as calculated on the basis of pure BU LRIC cost models by other EU NRAs without delay and in any event no later than 31 October 2019.
Document	BoR (19) 120 - BEREC Opinion on Phase II investigation pursuant to Article 7a of Directive 2002/21/EC as amended by Directive 2009/140/EC: Case PL/2019/2156 Market for wholesale call termination on individual public telephone networks provided at a fixed location (Market 1) in Poland - Remedies

C. Case EL/2019/2190 – Greece

Market	Wholesale market for terminating segments of leased lines in Greece (Market 4)

Description	Phase II was opened under Article 7a of the Framework Directive on 19 July 2019.
Outcome	EETT withdrew its notifications on 23 July 2019; there was no need to establish a BEREC EWG.
Document	No BEREC Opinion was issued.

D. Case SE/2019/2216 – Sweden

Market	Wholesale local access to fibre networks provided at a fixed location in Sweden (Market 3a)
Description	Phase II was opened under Article 7 of the Framework Directive on 6 December 2019.

The BEREC Opinion was adopted on 10 January 2020 and published on 14 January.

BEREC considered that the Commission's serious doubts were partially justified. BEREC was of the opinion that, based on the available information, the arguments developed by PTS to define a market for wholesale local access to fibre networks as national in scope are not sufficient and may not be appropriate to inform a detailed understanding of competitive market conditions across the country.

BEREC agrees with the Commission on the need for a more in-depth analysis of competitive market conditions in the determination of the relevant geographic market. However, BEREC does not agree that further analysis would necessarily result in a more granular approach to the geographic market definition. In the light of the Commission's serious doubts and the argumentation above, BEREC suggests that PTS could carry out a more in-depth assessment of competitive market conditions in the determination of the relevant geographic market in the provision of wholesale local access to fibre networks. BEREC also suggests that PTS could give further consideration to BEREC's Common Position on the geographic aspects of market analysis. |
| Outcome | The Commission adopted the Commission Decision C(2020) 619 of 7.2.2020 pursuant to Article 7(5) of Directive 2002/21/EC (Withdrawal of notified draft measure) - Case SE/2019/2216: Wholesale local access to fibre networks provided at a fixed location in Sweden.

It decided that PTS shall withdraw the draft measure. |
| Document | BoR (20) 03 |

2.6.11 Report on regulatory accounting in practice

This is the fifteenth Regulatory Accounting annual report which summarises the findings of a detailed survey of regulatory accounting systems across Europe. Information has been gathered from 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 this is defined in practice. The report provides also elements about structural parameters of each country and WACC methodologies applied by NRAs and WACC values currently in force. In future, BEREC will calculate several WACC parameters according to the methodologies outlined in the non-binding Commission's WACC Notice (published on 7 November 2019). The document offers an up-to-date factual report on the regulatory accounting frameworks implemented by NRAs and an assessment of the level of consistency achieved. Where possible, trends and comparisons with data collected in the past years have been illustrated.

The report focuses on the analysis of services in key wholesale markets: Wholesale Local Access (Market 3a/2014), Wholesale Central Access (Market 3b/2014) and Wholesale high quality access (Market 4/2014). Moreover the cost base and allocation methodologies used for fixed (Market 1/2014) and mobile (Market 2/2014) termination markets are also reported. Furthermore, as in last years' report, in order to include factors influencing NRAs' regulatory strategy, additional structural data (e.g. population, market and competitive structure, infrastructure) have been collected from NRAs.

The report also looks at annualisation methodologies provided by respondent NRAs. As in last year's report, accounting information for specific products in Market 3a, such as copper access (including LLU, SLU), fibre access (LLU, VULA), dark fibre access and duct access, has been further analysed. The report includes an updated section on the actual implementation of Termination Rates Recommendation 2009/396 of 7 May 2009.

An evaluation of the implementation of Recommendation 2013/466/EU on consistent non-discrimination obligations and costing methodologies is also presented. The report delivers in Chapter 5 an extended survey on WACC parameters, mainly focusing on market 3a and on the mobile market. The WACC chapter summarises the main methodologies currently used by NRAs, and sets out the reasons behind the estimation of single parameters needed to evaluate the cost of capital under the CAP-M model. The annex contains a number of tables providing further details on some of the analyses in the report.

Document:

BoR (19) 240: BEREC Report Regulatory Accounting in Practice 2019

Communication and cooperation

2.6.12 BEREC Annual reports

BEREC published its Annual Reports for 2018 on 13 June 2019. The Annual Report on developments in the electronic communications sector in 2018 had a foreword by the BEREC Chair 2018, Johannes Gungl, who noted that in 2018, BEREC contributed its expertise to the

EECC and that BEREC is prepared for its future tasks. He also highlighted BEREC's improved engagement with stakeholders both within and beyond Europe, and the fact that in completing all the deliverables in the Work Programme 2018, BEREC held 11 public consultations, which is the most public consultations in one year it has ever run.

Document:
BoR (19) 90: BEREC Annual Reports for 2018

2.6.13 Stakeholder Forum

On 16 October 2019, in Brussels, BEREC held its 7th Stakeholder Forum, which offered stakeholders from the telecoms and digital communications industries the opportunity to interact with BEREC on cybersecurity in the context of 5G networks, express their thoughts on the draft BEREC Work Programme 2020 and gain a futurist's insight into technology development. A panel discussion on the topic 'How to handle security in electronic communication and especially within 5G' attracted a high level of engagement among the attendees.

The purpose of the panel debate was to open up discussion and find out how BEREC stakeholders handled security within electronic communications. During the event, the incoming BEREC Chair presented the draft BEREC Work Programme 2020 and welcomed inputs from stakeholders for the ongoing public consultation. The author and visionary shared his forward-looking perspectives on digitalisation in the global marketplace and technology development. The audience also had an opportunity to share their thoughts on BEREC's past, present and future work. The stakeholders gave valuable input to BEREC's future work, as well as posed numerous questions to the BEREC Chair 2019, Chair for 2020 and the incoming Chair 2021. Participants stressed the importance of transparency, open communication and being able to be involved in BEREC's work, which is part of the reason BEREC continues to hold these annual Stakeholder Forums.

The first session of the Forum consisted of a panel discussion on the topic 'How to handle security in electronic communication and especially within 5G', and attracted a high level of engagement among the attendees. The session started with keynote remarks from the European Commission's Anthony Whelan, Dan Sjöblom, the incoming BEREC Chair 2020, Jonas Wessel, the Chairman of the Radio Spectrum Policy Group (RSPG), and the cybersecurity expert at the European Union Agency for Cybersecurity (ENISA), Marnix Dekker.

Thereafter, Erzsébet Fitori, Director General of the FTTH Council, led a panel discussion on the same topic. The panel included Professor Olav Lysne, Director at Simula Metropolitan, Hosuk Lee-Makiyama, Director of the European Centre for International Political Economy (ECIPE), Lidia Kozlowska, Senior Advisor at Flint Global and Rosa Barcelo, Partner and Co-Chair for Data Privacy, the cybersecurity group for Squire Patton Bloggs

After the first session, the incoming Chair, Dan Sjöblom, presented the draft BEREC Work Programme 2020, which was undergoing a public consultation at that time and stakeholders were requested to provide their feedback by the stipulated deadline.

2.6.14 BEREC Communications Plan 2019 (including 10th anniversary programme of activities)

Within the Communications Plan 2019, through targeted and transparent communications activities, BEREC strived to illustrate and highlight the integrity and credibility of the work that it produces. The BEREC Communications Plan 2019 included the organisation of the joint BEREC-IIC conference on 25-26 June 2019 in Riga, Latvia, as a crucial part of BEREC's 10th Anniversary celebrations. This independent forum brought together statutory national regulators and industry from all over the globe in a collegiate, neutral setting to debate policy issues. This meeting was open to all stakeholders from the telecommunications, media and technology sectors. Forum presentations were on the record, but subsequent discussions took place under the Chatham House Rule. This enabled participants to speak freely, facilitating the open and honest exchange of information, and maximising opportunities for the sharing of best practice among peers.

In 2019 BEREC updated its Communications Strategy. The updated Strategy sets out BEREC's overall approach for connecting with stakeholders. Its purpose is to promote the work of BEREC and its achievements to external audiences. It also supports a more frequent application of external communication as an active policy tool, when communication activities would be helpful in better advancing policy goals.

2.6.15 BEREC Work Programme 2020

The implementation of the new EECC will continue to be at the forefront of BEREC's work in 2020. BEREC's fundamental objectives and the objectives of the EECC will be the relevant pillars guiding its work over the coming years. In 2020, BEREC will also tackle new topics such as digital platforms and security issues especially in relation to 5G networks. The Work Programme 2020 reflects BEREC's commitment to serve as a body for thoughtful and proactive debate and advice for the European Parliament, the European Council and the European Commission in the electronic communications field.

BEREC will closely follow the development of the new Commission's agenda, which identifies 'digital' as one of its top three priorities. It is recognised that BEREC's Work Programme 2020 may need to be supplemented with activities relating to initiatives stemming from the new Commission. Furthermore, BEREC's future goals include playing an important role in improving the consistent application of regulatory rules, to enhance its working methodology and to develop and broaden its stakeholder cooperation and engagement efforts. In 2020, BEREC will also revise its strategic objectives and decide on a new Strategy.

In accordance with Article 5 of the BEREC Regulation, the BEREC Work Programme 2020 was subject to public consultation, which ran from 7 October to 6 November 2019. In addition, an early call for input was open from 19 March until 23 April 2019. The BEREC Work Programme 2020 was approved for publication by the BEREC Board of Regulators at its plenary meeting in Malta, on 5 and 6 December 2019.

Document:
BoR (19) 253: BEREC Work Programme 2020

2.6.16 Cooperation with EU institutions and institutional groups

In 2019 BEREC continued to work in close cooperation with the European Commission, both during its Plenary and Contact Network meetings, and also on an ongoing basis with, for example, quarterly videoconference calls with the Director General of DG Connect, Roberto Viola. Engagement with the Commission included BEREC initiating its activities early in 2019 for the fourth review of the Recommendation on relevant markets, by means of a targeted public consultation to which BEREC provided its contribution in June.

Additional cooperation between BEREC and European institutional groups in 2019 included BEREC signing a working arrangement[39] with the Radio Spectrum Policy Group (RSPG) on 13 June 2019. Through this working arrangement, BEREC and the RSPG intend 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 agreed that BEREC can 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.

Furthermore, in 2019 BEREC continued to develop its relationship with the European Union Agency for Cybersecurity (ENISA). A new BEREC ad hoc working group was established in 2019, the ad hoc 5G Cybersecurity group, which is tasked with reporting on security issues related to 5G implementation. Indeed, the 7th BEREC Stakeholder Forum was, in part, dedicated to the topic of cybersecurity in the context of 5G. During the Forum, a representative of ENISA was one of the distinguished opening speakers and a member of the panel discussion on how to handle security within electronic communications, particularly in respect of 5G.

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

2.6.17 International cooperation

During 2019, BEREC continued to maintain, and indeed build on, its close relationships with regional regulator groups as well as further developing its connections with global organisations in the field of electronic communications regulation.

BEREC international mission to China

BEREC Chair 2019 Mr Jeremy Godfrey (ComReg) and the Vice-Chairs Johannes Gungl (RTR), Mr Dan Sjöblom (PTS), Ms Tanja Muha (AKOS), Mr Konstantinos Masselos (EETT), Mr Marcin Cichy (UKE) accompanied by Ms Elisabeth Aarsæther (NKOM), Ms Elisabeth Dornetshumer (RTR) and Mr Tom Boyce, BEREC CN Chair 2019, travelled to China to meet institutional and industry stakeholders. The meetings were held in Beijing, Shenzhen and Hong Kong and covered a wide range of topics. The delegation was particularly interested in the following topics: 5G rollout and use cases, ultra-fast broadband, IoT and spectrum assignment. Regarding 5G rollout, from the discussions with different stakeholders, it appears

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[39] BoR (19) 100 – working arrangement between BEREC and RSPG

that China is making a big effort to be among the leading countries in the race towards 5G deployment. Net neutrality issues were discussed with one stakeholder, and while there is no legislation underpinning the OI principles, it appears that Chinese companies are monitoring the varying regional approaches on this subject across the world.

Memoranda of Understanding

In 2019 BEREC strengthened its commitment to its relationships with regulatory bodies beyond the European Union, for example EaPeReg (the network of non-EU Eastern European regulators) and Regulatel (the network of Latin-American regulators). This was achieved in October 2019 by extending the Memoranda of Understanding which were already in place between BEREC and EaPeReg and Regulatel, respectively. Prior to the 40th BEREC ordinary Plenary meeting in Crete (Greece), BEREC met with EaPeReg, Regulatel and EMERG (the network of Mediterranean and North African regulators) for a high-level Summit aimed at presenting international perspectives on investment and competition in the electronic communications sector. This event also marked the signing of the MoUs between BEREC and EaPeReg (physically) and Regulatel (virtually). Also present at this Summit was a representative from the International Telecommunications Union (ITU), Mr Jaroslaw Ponder. During the Plenary meeting a MoU was then signed between BEREC and the ITU, the purpose of which was to establish a high-level, non-exclusive framework for the cooperation which the signatories mutually intend to undertake in the area of electronic communications, to bring the benefits of ICT to people world-wide and in particular in Europe. The aim of this mutual cooperation is to share reports, guidelines and best practices, as well as participate in relevant meetings of both the ITU and BEREC, and to undertake joint actions such as thematic meetings, capacity building workshops and knowledge sharing and exchanges.

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

A. Meetings with the European Commission

Dates/place	Event
24 April 2019, Brussels, Belgium	Workshop on 5G spectrum authorisations (DG CNECT)
25 June 2019, Riga, Latvia	Meeting between BEREC Chair, Director General of DG CNECT, and the Minister of Transport of Latvia

B. Meetings with the European Parliament

Dates/place	Event
12 November 2019, Brussels	Meeting between BEREC representatives and the ITRE Committee members

C. Meetings and workshops with other EU bodies

Dates/place	Event
21 October 2019, Brussels, Belgium	Joint BEREC-RSPG workshop
19 March 2019, Brussels, Belgium	ENISA 15th Anniversary

Annex 2 Public debriefings and BEREC engagement with stakeholders

Dates/place	Event
13 March 2019, Brussels, Belgium	BEREC Public debriefing on the outcomes of the 38th Ordinary meeting
13 March 2019, Brussels, Belgium	Meeting with DIGITAL Europe
7 May 2019, Dublin, Ireland	Meeting with Google representatives on Net Neutrality
19 June 2019, Brussels, Belgium	BEREC Public debriefing on the outcomes of the 39th Ordinary meeting
24 June 2019, Riga, Latvia	Meeting with Huawei representatives
26 June 2019, Riga	Meeting with a representative of the Federal Communications Commission
10 October 2019, Brussels, Belgium	BEREC Public debriefing on the outcomes of the 40th Ordinary meeting
16 October 2019, Brussels, Belgium	7th BEREC Stakeholder Forum
11 December 2019, Brussels	BEREC Public debriefing on the outcomes of the 41st Ordinary meeting

Annex 3   International events

Dates/place	Event
15-16 January 2019, Amman, Jordan	BEREC-EMERG workshop on 5G regulations
12-14 February 2019, Kuala Lumpur, Malaysia	IIC telecommunications and media forum
11 March 2019, Geneva, Switzerland	ITU workshop on Benchmarking
20 March 2019, San Jose, Costa Rica	EU-LAC Cooperation on Digital Single Market project
1-3 April 2019, Cartagena de Indias, Colombia	Regulatel-BEREC WG meeting
31 March – 6 April 2019, China	BEREC Study trip 2019
17-18 April 2019, Split, Croatia	6th BEREC EaPeReg REWG meetings
13 May 2019, Brussels, Belgium	Western Balkans Roaming Policy Meeting
14-15 May 2019, Tbilisi, Georgia	EaPeReg Plenary meeting

Dates/place	Event
9-12 July 2019, Port Vila, Vanuatu	Participation of the BEREC Vice-Chairs (PTS and UKE) in the 19th Global Symposium for Regulators
20-21 August 2019, Lima, Peru	Participation of a BEREC representative (ARCEP) in the Regulatel QoS workshop
10-12 September 2019, Budapest, Hungary	Participation of the BEREC Chair in the ITU Telecom World Forum
1 October 2019, Geneva, Switzerland	Participation of the BEREC Chair in the ITU workshop on the "Economic Impact of OTT on National Telecommunication/ICT Markets"
26 - 27 November 2019, Riga, Latvia	Participation of a BEREC representative (RTR) in the EaPeReg Plenary meeting and workshop
4-6 December, Malta	Participation of a BEREC representative (ComReg) Accessible Europe Forum (ITU)

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

Dates/place	Event
10-11 January 2019, Dublin, Ireland	Meeting between the BEREC Chair and Vice-Chairs
15 January 2019, Riga, Latvia	Visit of the Incoming BEREC Chair 2020 (PTS) to the BEREC Office
16-17 January 2019, Brussels, Belgium	WG Co-Chairs meeting
18 February 2019, Dublin, Ireland	Preparatory meeting for BEREC workshop
24-25 October 2019, Stockholm, Sweden	Informal Mini-board meeting for the planning of 2020
12 December 2019, Riga, Latvia	Visit of the Incoming BEREC Chair 2021 (BIPT) to the BEREC Office

Annex 5   BEREC and BEREC Office organisational structure

BEREC OFFICE

Providing professional and administrative support

Supports

BOARD OF REGULATORS
- 1 member per Member State (Head of NRA)
- Participants without voting rights (3rd country NRAs and the European Commission)
- 4 Ordinary Meetings (OM) per year

CONTACT NETWORK
- Senior representatives of all members
- Representative of all participants without voting rights
- Prepares documents for the approval of the OM
- Meets 4 times a year, 20 days prior to the OM

WORKING GROUPS (WG)
- Develop BEREC documents
- Composed of experts from all the members and participants without voting rights
- Chaired by 2 experts from 2 different NRAs
- Meets when needed

End Users (EU)
Fixed Network Evolution (FNE)
Market and Economic Analysis (MEA)
Open Internet (OI)
Planning and Future Trends (PFT)
Regulatory Framework (RF)

Remedies (REM)
Roaming (ROAM)
Statistics and Indicators (SAI)
Wireless Network Evolution (WNE)
Ad-hoc 5G Cybersecurity (5GCS)

ADVICE TO
- Council of the EU
- European Commission
- European Parliament

OUTCOMES
- Advices
- Common positions/ approaches
- Databases
- Decisions
- Guidelines
- Methodologies
- Opinions
- Recommendations
- Regulatory best practices
- Reports/ Snapshots
- Strategies
- Studies
- Work Programmes
- Workshops

INTERACTION WITH THE PUBLIC
- Public consultations
- Public debriefings #BERECpublic
- Public hearings
- Stakeholders' forum #BERECforum

COOPERATES WITH
- Competent authorities of 3rd countries
- Competent EU bodies, offices, agencies and advisory groups
- International organisations
- Other competent authorities

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

Dates/place	Event	Agenda	Conclusions
6-8 March 2019, Budapest, Hungary	38th BEREC BoR plenary meeting and workshop	BoR (19) 20	BoR (19) 45
12-14 June 2019, Ghent, Belgium	39th BEREC BoR plenary meeting and workshop	BoR (19) 89	BoR (19) 145
2-4 October 2019, Crete	40th BEREC BoR plenary meeting and workshop	BoR (19) 172	BoR (19) 231
5-6 December 2019, Malta	41st BEREC BoR plenary meeting	BoR (19) 232	BoR (19) 271

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

Dates/place	Event	Agenda	Conclusions
14-15 February 2019, Bucharest	1st BEREC Contact Network meeting in 2019	BEREC CN (19) 01	BEREC CN (19) 34
23-24 May 2019, Rome, Italy	2nd BEREC Contact Network meeting in 2019	BEREC CN (19) 35	BEREC CN (19) 75
12-13 September 2019, Zadar, Croatia	3rd BEREC Contact Network meeting in 2019	BEREC CN (19) 77	BEREC CN (19) 108
14-15 November 2019, the Hague	4th BEREC Contact Network Meeting in 2019	BEREC CN (19) 109Rev1	BEREC CN (19) 145

Annex 8   Internal BEREC workshops

Dates/place	Event
9 May 2019, Vienna, Austria	BEREC workshop for new NRAs
25-26 June 2019, Riga, Latvia	BEREC-IIC joint conference "Competing Continents: The pursuit of excellence in electronic communications"
5 September 2019, Dublin, Ireland	BEREC 10th Anniversary event including workshop on Very High Capacity Network study

Annex 9   Events attended by the BEREC Chair and/or Vice-Chairs on behalf of BEREC

Dates/place	Event
16 January 2019, Brussels, Belgium	CEER expert roundtable discussions
22 January 2019, Brussels, Belgium	Participation of the BEREC Chair in the CERRE Executive Seminar - European Electronic Communications Code
20 February 2019, Brussels, Belgium	Participation of the BEREC Vice-Chair (UKE) in the CYBERSEC Brussels Leaders' Foresight – The 5G working lunch
25 February 2019, Barcelona, Spain	Participation of the BEREC Chair in the Mobile World Congress
28 February 2019, Bucharest, Romania	Participation by the BEREC Chair at the Third Eastern Partnership Ministerial Meeting on the Digital Economy
12-14 March 2019, Amsterdam, the Netherlands	Participation of the BEREC Chair and Vice-Chair (RTR) in the FTTH conference
29 April 2019, Brussels, Belgium	Participation of the BEREC Chair in the Vodafone conference on the Internet of Things
28 May 2019, Berlin, Germany	Participation of the BEREC Chair in the RSPG Stakeholder event

Dates/place	Event
19 June 2019, Brussels, Belgium	Participation of the BEREC Chair in the European Spectrum Management Conference
18 July 2019,Rome, Italy	Participation of the BEREC Vice-Chair (UKE) in the IIC workshop on the new European Electronic Communications Code
26-27 August 2019, Salzburg, Austria	Participation of the BEREC Chair in the Salzburg Telekom Forum
25 September 2019, Brussels, Belgium	Participation of the BEREC Chair in the 15th anniversary of FTTH Council
7-8 October 2019, London, United Kingdom	Participation of the BEREC Chair and Vice-Chairs (PTS and UKE) in the International Regulators' Forum 2019
15-16 October 2019, Brussels, Belgium	Participation of the BEREC Chair in the WIK Conference
17 October 2019, Brussels, Belgium	Participation of the BEREC Chair in the IRG Heads Workshop
18 October 2019, Budapest, Hungary	Participation of the BEREC Vice-Chair (UKE) in the 12th Florence Air Forum

Dates/place	Event
23 October 2019, Copenhagen, Denmark	Participation of the BEREC Chair in the Telecom 2019 conference
5 November 2019, Brussels, Belgium	Participation of the BEREC Chair in the Competition Law & Regulation in the Telecoms & Communications Sectors Conference
6 November 2019, Brussels, Belgium	Participation of the BEREC Chair in the PEER Roundtable on Bundled Products
13-14 November, Amsterdam, the Netherlands	Participation of the BEREC Vice-Chair (PTS) Telecom Infra Project Summit
27-29 November 2019, Riga, Latvia	Participation of the BEREC Chair and Vice-Chair (UKE) in the 2nd annual Baltic Sea Region 5G Ecosystem Forum "5G Techritory"
10 December 2019, Brussels, Belgium	Participation of the BEREC Chair in the 7th Annual Transatlantic Digital Economy Conference 2019
10-11 December, Brussels, Belgium	Participation of the BEREC Chair and Vice-Chair (PTS) in the ECTA Regulatory Conference 2019
13 December 2019, Florence, Italy	Participation of the BEREC Vice-Chair (UKE) in the 9th FSR Communication and Media Conference

Annex 10 Publicly available documents approved by the Board of Regulators (BoR) in 2019

A. BEREC opinions

Document number	Description	Date
BoR (19) 122	BEREC Opinion on Phase II investigation pursuant to Article 7a of Directive 2002/21/EC as amended by Directive 2009/140/EC: Case PL/2019/2156 Market for wholesale call termination on individual public telephone networks provided at a fixed location (Market 1) in Poland - Remedies	10 June 2019
BoR (19) 101	BEREC opinion on the functioning of the roaming market as input to EC evaluation	13 June 2019
BoR (19) 168	BEREC supplementary analysis on wholesale roaming costs	19 September 2019

B. BEREC reports

Document number	Description	Date
BoR (19) 21	International Roaming BEREC Benchmark Data Report April 2018 - September 2018	07 March 2019
BoR (19) 27	BEREC Report on Terminating Contracts and Switching Provider	07 March 2019
BoR (19) 26	BEREC Report on the outcome of the public consultation on the draft BEREC Report on Terminating Contracts and Switching Provider	07 March 2019

Document number	Description	Date
BoR (19) 24	BEREC Report on the outcome of the public consultation on the draft BEREC Report on Internet of Things Indicators	07 March 2019
BoR (19) 25	BEREC Report on Internet of Things indicators	07 March 2019
BoR (19) 22	BEREC Report on the outcome of the public consultation on the draft BEREC Report on Pricing for access to infrastructure and civil works according to the BCRD	07 March 2019
BoR (19) 32	BEREC report on the Process for developing BEREC Work Programmes	07 March 2019
BoR (19) 94	BEREC Report on Access to physical infrastructure in the context of market analysis	13 June 2019
BoR (19) 90	BEREC Annual Reports for 2018	13 June 2019
BoR (19) 106	BEREC Report on the Data Economy	13 June 2019
BoR (19) 105	BEREC Report on the outcome of the public consultation on the data economy	13 June 2019
BoR (19) 93	BEREC Report on the outcome of the public consultation on Access to physical infrastructure in the context of market analysis	13 June 2019
BoR (19) 109	BEREC report on the outcomes of the public consultation on the draft BEREC Common position on infrastructure sharing	14 June 2019

Document number	Description	Date
BoR (19) 91	BEREC Report on Termination rates at the European level	14 June 2019
BoR (19) 178	Summary report on the Workshop to move towards a vision for Europe's telecoms consumers	03 October 2019
BoR (19) 174	International Roaming BEREC Benchmark Data Report October 2018 – March 2019	03 October 2019
BoR (19) 177	Report on the implementation of Regulation (EU) 2015/2120 and BEREC Net Neutrality Guidelines	03 October 2019
BoR (19) 176	Report on BEREC International Mission to China	03 October 2019
BoR (19) 216	Voting report on the e-clearance on Draft BEREC Input on weighted average of maximum mobile termination rates	09 October 2019
BoR (19) 222	Voting report on the e-clearance on BEREC Internal Survey on the state of play for security requirements in 3G, 4G and 5G Electronic Communication Networks in Europe.	30 October 2019
BoR (19) 229	Voting report on the e-clearance on draft BEREC input to the EC public consultation on voice call termination rates in the EU.	07 November 2019
BoR (19) 230	Voting report on the e-clearance on the MoU between BEREC and Regulatel.	07 November 2019
BoR (19) 244	BEREC Preliminary report on the harmonised collection of data from both Authorised Undertakings and OTT operators	05 December 2019

Document number	Description	Date
BoR (19) 245	Report on the impact of 5G on regulation and the role of regulation in enabling the 5G ecosystem	05 December 2019
BoR (19) 252	BEREC Report on the outcome of the public consultation on the draft Work Programme for 2020	05 December 2019
BoR (19) 235	7th BEREC report on transparency and comparability of international roaming tariffs	05 December 2019
BoR (19) 236	BEREC summary report on the outcomes of the internal workshop on the migration from legacy infrastructures to fibre-based networks	05 December 2019
BoR (19) 237	BEREC Report on the outcome of the Public Consultation on the BEREC Guidelines on the minimum criteria for a reference offer relating to obligations of transparency	05 December 2019
BoR (19) 239	Summary report on the internal workshop on ERT/margin squeeze tests applied by NRAs on 11 October 2019	05 December 2019
BoR (19) 242	Summary Report on the 7th BEREC Stakeholder Forum	05 December 2019
BoR (19) 240	BEREC Report Regulatory Accounting in Practice 2019 (including WACC chapter)	05 December 2019

Document number	Description	Date
BoR (19) 258	BEREC Report on the outcome of the public consultation on the draft Guidelines for the notification template pursuant to Art. 12.4 of the European Electronic Communications Code	06 December 2019
BoR (19) 260	BEREC Report on Member States' best practices to support the defining of adequate broadband internet access service	06 December 2019

C. Documents approved for public consultation

Document number	Description	Date
BoR (19) 130	Public consultation on the draft BEREC Guidelines on the minimum criteria for a reference offer	19 June 2019
BoR (19) 180	Public Consultation on the draft BEREC Guidelines on the Implementation of the Open Internet Regulation	03 October 2019
BoR (19) 208	Public consultation on BEREC Work Programme 2020 and call for input to the BEREC Medium Term Strategy 2021-2023	07 October 2019
BoR (19) 213	Public consultation for the draft BEREC Guidelines detailing Quality of Service Parameters	10 October 2019
BoR (19) 210	Public consultation for BEREC draft Feasibility study on development of coverage information for 5G deployments	10 October 2019

Document number	Description	Date
BoR (19) 209	Public consultation on the document on BEREC Guidelines on the Implementation of the Open Internet Regulation	10 October 2019
BoR (19) 214	Public consultation on the draft BEREC Guidelines on Geographical surveys of network deployments	10 October 2019
BoR (19) 265	Public consultation for the draft BEREC Report on Member States' best practices to support the defining of adequate broadband internet access service	11 December 2019
BoR (19) 267	Public consultation for BEREC guidelines on how to assess the effectiveness of public warning systems transmitted by different means	11 December 2019

D. Annual work programme and annual reports

Document number	Description	Date
BoR (19) 06	Outline for BEREC 2020 Work Programme	31 January 2019
BoR (19) 32	BEREC report on the Process for developing BEREC Work Programmes	7 March 2019
BoR (19) 90	BEREC annual reports 2018	13 June 2019
BoR (19) 253	BEREC 2020 Work Programme	5 December 2019

E. Regulatory best practices

Document number	Description	Date
BoR (19) 110	BEREC Common Position on infrastructure sharing	13 June 2019
BoR (19) 260	BEREC Report on Member States' best practices to support the defining of adequate broadband internet access service	6 December 2019

F. Other documents

Document number	Description	Date
BoR (19) 196	Memorandum of Understanding between Group of Eastern Partnership Regulators for Electronic Communications Networks and Services (EaPeReg Network) and Body of European Regulators for Electronic Communications (BEREC)	3 October 2019
BoR (19) 173	Memorandum of Understanding between the International Telecommunication Union (ITU) and the Body of European Regulators for Electronic Communications (BEREC) to establish a high-level framework of cooperation in the area of electronic communications	3 October 2019
BoR (19) 225	Memorandum of Understanding between The Latin American Forum of Telecommunications Regulators (REGULATEL) and Body of European Regulators for Electronic Communications (BEREC)	11 November 2019

Document number	Description	Date
BoR (19) 242	Summary Report on the 7th BEREC Stakeholder Forum	5 December 2019

Annex 11 Board of Regulators electronic voting procedures

No	Subject	Comments round		Voting round	
		Start/link to documents	End	Start/link to documents	End/link to record
1.	Management Board Decision delegating the powers conferred by the Staff Regulations on the appointing authority and by the Conditions of Employment of Other Servants on the authority empowered to conclude contracts of employment to the Director of the BEREC Office	07 January 2019	08 January 2019	09 January 2019	10 January 2019
2.	BEREC Office Single Programming Documents for 2019-2021 and 2020-2022 and the BEREC Office Final Budget for 2019	15 January 2019	22 January 2019	24 January 2019	31 January 2019
3.	Outline BEREC Work Programme 2020	21 January 2019	24 January 2019	25 January 2019	31 January 2019
4.	BEREC input to the Commission's consideration for the WACC Guidance	1 February 2019	5 February 2019	6 February 2019	7 February 2019

No	Subject	Comments round		Voting round	
		Start/link to documents	End	Start/link to documents	End/link to record
5.	Decision of the MB of the Agency for Support for BEREC (BEREC Office) authorising the BEREC Office Director to engage in a joint project with the Government of the Republic of Latvia for a Headquarters (HQ) agreement	13 March 2019	20 March 2019	21 March 2019	28 March 2019
6.	Board of Regulators Rules of Procedure	27 March 2019	3 April 2019	11 April 2019	18 April 2019
7.	Management Board Rules of Procedure	27 March 2019	3 April 2019	11 April 2019	18 April 2019
8.	Decision of the Management Board of the Agency for Support for BEREC on organisation of an External Workshop on Guidelines to assist National Regulatory and/or other Competent Authorities on the consistent implementation of their obligations under Article 22	8 April 2019	9 April 2019		
9.	Update of the PRD of the Report on Regulatory Accounting in practice 2019	9 April 2019	10 April 2019	11 April 2019	12 April 2019

No	Subject	Comments round		Voting round	
		Start/link to documents	End	Start/link to documents	End/link to record
10.	Decision of the Management Board of the Agency for Support for BEREC on the organisation of External Workshops to support BEREC activities related to working groups deliverables	3 May 2019	6 May 2019	7 May 2019	8 May 2019
11.	Decision of the Board of Regulators of BEREC to establish working arrangements between the Body of European Regulators for Electronic Communications (BEREC) and the NRAs of Montenegro, Bosnia & Herzegovina, Albania, North Macedonia, Kosovo* , Serbia, Norway, Iceland and Liechtenstein	10 May 2019	17 May 2019	17 May 2019	21 May 2019
12.	Decision of the BEREC Office Management Board to establish Working Arrangements between NRAs of Montenegro, Bosnia & Herzegovina, Albania, North Macedonia, Kosovo* , Serbia, Norway, Iceland and Liechtenstein and the Body of European Regulators for Electronic Communications (BEREC)	10 May 2019	17 May 2019	17 May 2019	21 May 2019

No	Subject	Comments round		Voting round	
		Start/link to documents	End	Start/link to documents	End/link to record
13.	BEREC Input to the EC Implementing Act on the Contract Summary Template	28 May 2019	29 May 2019	29 May 2019	30 May 2019
14.	Article 7a opinion: PL/2019/2156	03 June 2019	05 June 2019	07 June 2019	10 June 2019
15.	2018 CAAR, MB opinion on final accounts and reply to ECA	13 June 2019	20 June 2019	21 June 2019	28 June 2019
16.	Rules of procedure on the operation of BEREC Working Groups	09 July 2019	16 July 2019	17 July 2019	24 July 2019
17.	Draft Decision of the Management Board of the Agency for Support for BEREC on the financial regulation applicable to the BEREC Office	22 July 2019	29 July 2019	31 July 2019	7 August 2019

No	Subject	Comments round		Voting round	
		Start/link to documents	End	Start/link to documents	End/link to record
18.	Draft Decision of the Board of Regulators adopting implementing rules on data protection	26 August 2019	2 September 2019	03 September 2019	10 September 2019
19.	Draft Decision of the Management Board of the Agency for Support for BEREC adopting implementing rules on data protection	26 August 2019	2 September 2019	03 September 2019	10 September 2019
20.	BEREC Input following to the Contract Summary Template Implementing Act	05 September 2019	06 September 2019	06 September 2019	09 September 2019
21.	Draft supplementary BEREC opinion on wholesale costs	11 September 2019	16 September 2019	17 September 2019	19 September 2019
22.	Draft BEREC Input on weighted average of maximum mobile termination rates	25 September 2019	2 October 2019	2 October 2019	9 October 2019

No	Subject	Comments round		Voting round	
		Start/link to documents	End	Start/link to documents	End/link to record
23.	MoU between BEREC and EaPeReg	26 September 2019	27 September 2019	27 September 2019	30 September 2019
24.	MoU between BEREC and ITU	27 September 2019	30 September 2019	30 September 2019	2 October 2019
25.	Draft Decision of the Management Board of the Agency for Support for BEREC on financing the acquisition of historical data sets for the calculation of certain parameters underlying the weighted average cost of capital (WACC)	18 October 2019	21 October 2019	21 October 2019	23 October 2019
26.	BEREC Internal Survey on the state of play for security requirements in 3G, 4G and 5G Electronic Communication Networks in Europe	22 October 2019	25 October 2019	29 October 2019	30 October 2019

No	Subject	Comments round		Voting round	
		Start/link to documents	End	Start/link to documents	End/link to record
27.	BEREC input to the EC public consultation on voice call termination rates in the EU	31 October 2019	5 November 2019	6 November 2019	7 November 2019
28.	MoU between BEREC and Regulatel	1 November 2019	5 November 2019	6 November 2019	7 November 2019
29.	Draft decision of the Management Board on the Establishment of the BEREC Office Advisory Group and on the Appointment of its Chair	10 December 2019	12 December 2019	13 December 2019	17 December 2019
30.	Draft decision of the Management Board on SPD of the Activities of the BEREC Office for the period 2020-2022	10 December 2019	13 December 2019	17 December 2019	19 December 2019

Annex 12 BEREC Members and Observers of the Board of Regulators by end 2019

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	Ilir	**Zela**	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	Mr	Jaromír	**Novák**	Czech Telecommunication Office (CTU)	Member
8.	Denmark	Mrs	Katrine	**Windning**	Danish Business Authority (DBA)	Member

No	Country (if applicable)	Title	Name(s)	Surname(s)	Name of organisation	Member or observer
9.	Estonia	Mr	Kaur	**Kajak**	Estonian Technical Regulatory Authority (ETRA)	Member
10.	Finland	Mrs	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	Angelo Marcello	**Cardani**	Autorità per le Garanzie nelle Comunicazioni (AGCOM)	Member
19.	Kosovo	Mr	Kreshnik	**Gashi**	Regulatory Authority of Electronic and Postal Communications (ARKEP)	Observer

No	Country (if applicable)	Title	Name(s)	Surname(s)	Name of organisation	Member or observer
20.	Latvia	Mr	Rolands	**Irklis**	Public Utilities Commission (SPRK)	Member
21.	Liechtenstein	Mr	Rainer	**Schnepfleitner**	Office for Communications / Amt für Kommunikation (AK)	Observer
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	Mrs	Elisabeth	**Sørbøe Aarsæther**	Norwegian Communications Authority Nkom	Observer
27.	Poland	Mr	Marcin	**Cichy**	Office of Electronic Communications (UKE)	Member
28.	Portugal	Mr	Joao Antonio	**Cadete de Matos**	Autoridade Nacional de Comunicações (ANACOM)	Member
29.	Romania	Mr	Sorin Mihai	**Grindeanu**	National Authority for Management and Regulation in Communications (ANCOM)	Member
30.	Serbia	Mr	Vladica	**Tintor**	Regulatory Agency for Electronic Communications and Postal Services (RATEL)	Observer
31.	Slovak Republic	Mr	Vladimír	**Kešjar**	Regulatory Authority for Electronic	Member

No	Country (if applicable)	Title	Name(s)	Surname(s)	Name of organisation	Member or observer
					Communications and Postal Services (RÚ)	
32.	Slovenia	Mrs	Tanja	**Muha**	Agency for Communication Networks and Services of the Republic of Slovenia (AKOS)	Member
33.	Spain	Mr	Bernardo	**Lorenzo**	Comisión Nacional de los Mercados y la Competencia **(**CNMC)	Member
34.	Sweden	Mr	Dan	**Sjoblom**	National Post and Telecommunications Agency (PTS)	Member
35.	The Netherlands	Mr	Henk	**Don**	Authority for Consumers and Markets (ACM)	Member
36.	Turkey	Mr	Ömer Abdullah	**Karagözoğlu**	Information and Communication Technologies Authority (ICTA)	Observer
37.	United Kingdom	Mrs	Lindsey	**Fussell**	Office of Communications (OFCOM)	Member
38.		Mr	Roberto	**Viola**	European Commission	Observer
39.		Mr	Gunnar Thor	**Pétursson**	European Free Trade Association (EFTA) Surveillance Authority (ESA)	Observer

Riga, 29 October 2019
BEREC Office

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

EWG - Expert Working Group

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