

BEREC Annual Reports - 2017

14 June, 2018

Table of Contents

PART A: Annual report on developments in the electronic communications sector in 2017 – under Article 3(1)(n) of the BEREC Regulation.....7

Executive summary.....7

1 Introduction.....9

2 Market trends10

2.1. Economic context10

2.2. Market players14

2.3. Mergers and acquisitions17

2.4. Broadband and next-generation take-up22

2.5. Mobile broadband28

2.6. Termination rates29

2.7. Mobile termination rates30

2.8. Fixed termination rates31

2.9. SMS termination rates32

2.10. Regulatory accounting33

3 Framework review35

4 Openness of the internet.....36

4.1. Strengthening and ensuring the consistent implementation of net neutrality throughout Europe.....36

4.2. Devices and open internet37

5 International roaming developments37

Conclusion.....44

PART B: Annual Report on BEREC activities in 2017 – under Article 5(5) of Regulation (EC) No 1211/2009 of the European Parliament and of the Council of 25 November 2009 establishing the Body of European Regulators for Electronic Communications (BEREC) and the Office45

1 Introduction.....45

2 Work Programme 201745

2.1 Promoting competition and investment45

2.1.1 The impact of content and devices on fixed and mobile electronic communications sector markets.....45

2.1.2 Convergence of fixed and mobile networks.....46

2.1.3	New forms of sharing passive optical networks based on wavelength division multiplexing.....	47
2.1.4	Implementation of the Broadband Cost Reduction Directive	48
2.1.5	Access conditions to State aid-funded infrastructure.....	49
2.1.6	Facilitating mobile connectivity in ‘challenge areas’	50
2.1.7	Internet protocol interconnection practices in the context of net neutrality.....	51
2.1.8	Monitoring of mobile network coverage.....	52
2.2	Promoting the internal market.....	53
2.2.1	Framework review	53
2.2.2	Contribution to the review of SMP guidelines.....	55
2.2.3	Update of BEREC guidelines on the Roaming Regulation	55
2.2.4	Input to the Commission Implementing Act on weighted average mobile termination rates.....	56
2.2.5	Periodic international roaming reports.....	56
2.2.5.1	Benchmark report	56
2.2.5.2	Report on the transparency and comparability of roaming tariffs..	57
2.2.6	Opinion on Phase II cases	58
2.3	Empowering and protecting end-users.....	63
2.3.1	Current definition and provision of universal service	63
2.3.2	Implementation of Regulation 2015/2120 and Net Neutrality Guidelines.....	64
2.3.3	Regulatory assessment of quality of service in the context of net neutrality.....	65
2.3.4	Net neutrality supervision tools and methods.....	66
2.4	Horizontal and regulatory quality aspects	66
2.4.1	Review of the BEREC Strategy 2018-2020.....	66
2.4.2	Benchmarking of termination rates	67
2.4.3	Regulatory accounting in practice	68
2.4.4	Non-residential market indicators for the Digital Scoreboard.....	69
3	Representation and cooperation	69
3.1	Events, speeches and presentations	69
3.2	Workshops.....	70
3.3	BEREC Stakeholder Forum	70
3.4	International cooperation	72
3.5	Engagement with EU institutions	73
4	Organisational issues.....	74

Annex 1	Meetings with EU institutions and other EU bodies	76
A.	Meetings with the European Commission (EC).....	76
B.	Meetings with the European Parliament (EP)	77
C.	Meetings with the Council of the EU	78
D.	Meetings and workshops with other EU bodies.....	79
Annex 2	Public debriefings and BEREC engagement with stakeholders.....	80
Annex 3	International events	81
Annex 4	Meetings between the BEREC Chair, Vice-Chairs and Expert Working Group (EWG) Chairs	82
Annex 5	Plenary meetings of the Board of Regulators (BoR).....	84
Annex 6	Meetings of the Contact Network (CN) established prior to the Board of Regulators (BoR)	85
Annex 7	Internal BEREC workshops	86
Annex 8	Events attended by the BEREC Chair and/or Vice-Chairs on behalf of BEREC	87
Annex 9	Publicly available documents approved by the Board of Regulators (BoR) in 2017	91
A.	BEREC Opinions	91
B.	BEREC Reports.....	93
C.	Board of Regulators (BoR) Decisions	96
D.	Documents approved for public consultation	97
E.	Annual work programme and annual reports	97
F.	Regulatory best practices	98
G.	Other documents	98
Annex 10	Electronic voting procedures of the Board of Regulators (BoR)	99
List of acronyms	110

Foreword by the BEREC Chair 2017

The year of 2017 was an intense and productive year for BEREC and for the telecoms sector in Europe. It was a year in which we had to rethink the way we regulate the electronic communications and digital sectors for the years to come, in the context of the multiplication of uses and reshaping of the digital ecosystem (notably IoT) and the subsequent growing need for super-fast connectivity. The publication in September 2016 by the European Commission of a proposal for a European Electronic Communications Code has triggered deep reflections among NRAs on what the regulation of tomorrow should look like.

BEREC has thus delivered an ambitious work programme focusing on the review of the European regulatory framework for electronic communications, whilst also continuing notable work on connectivity and Open Internet rules, as well as considering how to reinvent BEREC from within.

Review of the European regulatory framework for electronic communications

The review was one of the structuring projects in BEREC's work in 2017. BEREC was committed throughout the year to provide technical expertise to the co-legislators in their analysis of the Commission's proposals. BEREC's work resulted in the publication of a series of technical opinions in May 2017 (including inputs on issues relating to access regulation, institutional aspects and spectrum regulation) and in October 2017 (on universal service and general authorisations).

In these opinions, BEREC reiterated its support for the Commission's connectivity goals directed towards the deployment of very high-capacity (VHC) networks and 5G, stressing that competition remains a major driver of investment in networks and that regulation should not be seen as being opposed to investment. For BEREC, it is important that national regulators retain sufficient room of manoeuvre in order to define the appropriate regulation, for instance in the context of ensuring viable co-investment, and so that the Code does not lead to the automatic deregulation of markets. BEREC also welcomed the Commission's proposal to give regulators a role in defining spectrum allocation conditions, which are likely to have a wide impact on the market, whilst allowing for the development of coordination at the European level.

BEREC also issued a high-level statement in October in support of the Commission's proposal to introduce a minimum set of competencies for national regulators to enable effective coordination within BEREC and thus enable it to contribute to the Digital Single Market.

Safeguarding an Open Internet

Safeguarding an Open Internet in Europe was one of the top priorities of BEREC's work in 2017, one year after the adoption of its Guidelines on the implementation of the 2015 European Open Internet Regulation.

BEREC continued to support the consistent implementation of the Guidelines and the Regulation by NRAs by pooling the tools and methods used to detect breaches of the rules and by developing a forum for exchange between these authorities on their

specific implementation cases. To further support NRAs in their implementation work, it was decided at the end of 2017 to develop an opt-in measurement tool within BEREC to help NRAs and end-users measure the quality of fixed or mobile internet access services and detect potential illegal traffic management practices, such as blocking or throttling of specific applications. This tool is planned to be operational by end of 2019.

This ambitious work on safeguarding net neutrality has been strengthened by BEREC's relations with regulators outside Europe. In this regard, 2017 was marked by the development of bilateral relations with TRAI, the Telecom Regulatory Authority of India, with a particular emphasis on net neutrality. Exchanges between experts from BEREC and TRAI took place on this subject in 2017 and the BEREC study trip organised in India paved the way for further cooperation in the view of the adoption of a Memorandum of Understanding between the two institutions in 2018. A summit was also held on 31 May 2017 between BEREC and the networks of regulators from Central and South America (Regutel), from the Euro-Mediterranean area (EMERG) and from the Eastern Partnership (EaPeReg). This summit was an opportunity to reiterate the regulators' commitment to ensuring broadband connectivity.

Enhancing connectivity in Europe

Enhancing connectivity in Europe, especially with a new reinforced focus on mobile connectivity, has been another major focus for BEREC this year.

To this end, BEREC adopted a preliminary report on mobile coverage, aimed at developing a common understanding of the different ways of measuring mobile coverage and presenting data (raw data, maps, etc.). This report was a first step towards the elaboration of a common position on the subject to be published for consultation in June 2018.

It also published a joint report with RSPG (Radio Spectrum Policy Group) on the challenges related to the coverage of areas with particular difficulties (such as unprofitable areas or transport routes), adopted at the end of December 2017 following a public consultation.

Reinventing BEREC

Finally, 2017 was an important year for BEREC as it continued to reinvent its working methods internally and increase its interactions with stakeholders and civil society. Internally, BEREC has endeavoured to increase forums for exchange between national experts on their daily regulatory work, in particular in relation to the implementation of the Open Internet Regulation.

Externally, this process involved the development of early consultations on BEREC's work with stakeholders and civil society and the establishment of a consultation platform to facilitate feedback on its draft reports. This increased dialogue with stakeholders and civil society has also led to the adoption of a renewed format for the annual BEREC Stakeholder Forum in Brussels, to bring BEREC ever closer to industry expectations and market developments.

In line with this objective, BEREC has reviewed its strategy for the coming years, in order to take into account the latest market developments in its future work. This strategy thus defines 5 strategic priorities that will guide BEREC's activities over the next 3 years:

- Responding to connectivity challenges and to new conditions for access to high-capacity networks
- Monitoring potential bottlenecks in the distribution of digital services
- Enabling 5G and promoting innovation in network technologies
- Fostering a consistent approach of the net neutrality principles
- Exploring new ways to boost consumer empowerment

These strategic priorities are clearly aimed at strengthening the role of BEREC as an enabler of the EU's Digital Single Market strategy, which has been an ongoing objective for BEREC over recent years, as proved by the adoption of its Guidelines on Net Neutrality in 2016 and the work of BEREC to help make Roam-Like-at-Home become a reality over the past three years.

The strategic priorities have already guided BEREC's 2018 Work Programme, which will be marked in particular by a strong emphasis on the deployment of 5G in Europe.

All these achievements would not have been possible without the professional support and cooperation of the BEREC Office staff in Riga, as well as the excellent work of the national experts taking part in the Expert Working Groups. The support that the Vice-Chairs provided throughout my chairmanship was also decisive in making this year a success.

I am convinced that this support will lead my successor, Johannes Gunzl, to another successful year as BEREC Chair for 2018.

Sébastien Soriano, BEREC Chair 2017

PART A: Annual report on developments in the electronic communications sector in 2017 – under Article 3(1)(n) of the BEREC Regulation

Executive summary

This report by the Body of European Regulators for Electronic Communications (BEREC) presents the major trends in the electronic communications sector, addressing both market dynamics and the development of EU public policies and regulatory practices. Although the report is mainly based on the key findings of the BEREC expert working groups in 2017, it also aims to adopt a forward-looking approach.

Europe continues to see innovation in all areas of electronic communications and has witnessed relevant developments in the industry.

Figures suggest that telecoms sector revenue grew by 0.1% in 2017, with growing pressure for 5G and fibre deployment. Despite the apparent ubiquity of mobile telephone usage in recent years, the revenue share of mobile services, compared with fixed services, has remained relatively stable. In 2017, fixed services revenues accounted for 49%, compared with a mobile services market share of 51%.

In 2017, total telecoms sector revenues for the EU-28 were approximately EUR 223 billion, based on growth of less than 1% on the previous year. European mobile operators account for 51% of this total revenue figure, while fixed telephony and fixed broadband account for 17% and 32% respectively.

Consolidation through mergers and acquisitions (M&A) continued in the European electronic communications services markets in 2017, although at a slower pace than in previous years. This consolidation process involved both mergers in the same markets (either fixed or mobile) and fixed/mobile mergers. In most cases, the mergers have been national in scope, implying that a majority of concentration operations aimed to strengthen a firm's market position in a European national market, rather than to extending its footprint to cover additional countries. Almost all of the M&As were cleared by competition and regulatory authorities, although many of them were subject to specific commitments designed to ensure that effective competition would not be significantly reduced as a result of the concentration.

Given the ever-increasing demand for telecommunications services, evidence suggests operators are investing despite the difficult economic conditions. In general, European operators appear to be investing more despite the challenges they face.

Mobile broadband is the fastest-growing segment of the broadband market. In July 2017, almost 90.2% of EU-28 inhabitants used mobile broadband, 6.4 percentage points (p.p.) more than 1 year earlier and up from 33% 4 years ago. The Organisation for Economic Co-operation and Development (OECD) area average is even higher, having increased by 6.7 p.p. in the year, taking mobile broadband penetration to over 100% in the OECD area for the first time. The key drivers behind this growth include increasing the population coverage of 3G and 4G networks, more affordable

smartphones and data tariffs, and a growing young population with increasing digital skills, as well as an increasing willingness to consume social media and a range of services and content online.

Fixed broadband penetration in the EU-28 countries reached, on average, 33.7 per 100 inhabitants in July 2017, up from 30.5 a year earlier, while the OECD area average is around 30.6 per 100 inhabitants.

Next-generation access (NGA) take-up registered positive growth across the EU in 2017. Although the stock of fixed broadband lines (supported by all technologies) grew at an annual rate of 4% in the period between July 2013 and July 2017, the demand for NGA subscriptions grew even more quickly, at an annual rate of 30%.

Following interventions by national regulatory authorities (NRAs) and the application of the Commission Recommendation on termination rates, the wholesale rates for both mobile and fixed interconnection have fallen significantly and continue to decrease. By contrast, in most EU countries, SMS services are not subject to wholesale termination price regulation. Nevertheless, a substantial decrease in SMS termination rates has been observed in the EU markets over the years.

Wholesale interconnection rates for mobile telephony services (mobile telephony rates – MTRs) in Europe fell markedly between January 2004 and July 2017: the simple average fell from 14.08 to 1.06 cents per minute, while the weighted average fell from 14.47 to 0.93 cents per minute.

Compared with that in MTRs, the reduction in fixed termination rates (FTRs) was smaller, as the level of tariffs has been significantly lower. On 1 July 2017, the simple average of the lowest regulated FTR of incumbents at European level (all 37 countries) stood at 0.36 cents per minute. The simple average of the lowest FTR of European Union incumbents (EU-28) stood at 0.22 cents per minute.

The overall picture with regard to cost accounting methodologies is relatively stable in comparison with 2016, with just a small number of changes by NRAs having taken place. There are clear preferences for price control methods (generally cost orientation alone or in combination with price caps, but the overall picture is becoming more differentiated), cost base (current cost accounting) and allocation methodologies (mainly long-run incremental costs, with fully distributed costs preferred in only a few markets). The degree of consistency of application of methodologies continues to be high and accommodates the use of elements or parameters that reflect national circumstances.

The regulatory developments in the electronic communications sector should be considered in the context of the economic trends outlined above. At the end of 2016 the European Commission had already embarked on a project to update the relevant pieces of EU legislation to adapt them to newly emerged market dynamics and actors, as well as to the policy objectives set in response. During 2017, the co-legislators made significant progress in the analysis of the Commission's legislative proposals.

With regard to the openness of the internet, Regulation (EU) 2015/2120 has been applicable since 31 April 2016, and the BEREC Net Neutrality Guidelines were adopted on 30 August 2016. The BEREC Report on the implementation of Regulation (EU) 2015/2120 and BEREC Net Neutrality Guidelines, published after the fourth plenary

meeting in 2017, found that NRAs' practices relating to the core principles of net neutrality, such as bans on the blocking of applications and on discriminatory treatment of specific traffic, were consistent. BEREC concludes that, so far, the Net Neutrality Guidelines have been well suited to assisting NRAs in performing their tasks of supervision and enforcement as set out in the Regulation.

Since 15 June 2017 and thanks to Regulation (EU) 2015/2120, roaming charges in the EU and the EEA have been history. Consumers in the EU can now use their mobile phones within the EU as at home, without any additional surcharge ('Roam Like at Home'). Only in exceptional cases may an operator levy a surcharge for roaming in the EU.

At the wholesale level, the EEA average price for voice services was 2.52 cents in Q2 2017 and 2.41 cents in Q3 2017, compared with caps of 5 cents and 3.2 cents respectively. The average EEA SMS price decreased to 0.68 cents in Q2 2017 and subsequently to 0.55 cents in Q3 2017. The EEA average price for wholesale data services fell to 0.57 cents per MB in Q2 2017 and 0.40 cents per MB in Q3 2017, compared with 1.02 cents and 0.99 cents in Q2 2016 and Q3 2016 respectively.

1 Introduction

The electronic communications sector is vital for boosting productivity and bringing growth back to the EU. Completing the creation of a single market in electronic communications is a crucial part of the EU's overriding objective for stimulating economic recovery in Europe. The Body of European Regulators for Electronic Communications (BEREC) is committed to this goal as well as the Article 8 Framework Directive objectives and recognises its central role in ensuring regulatory consistency across Europe. BEREC therefore closely monitors and reports on developments in the electronic communications sector and publishes its annual report on sector developments under Article 3(1)(n) of the BEREC Regulation (Regulation (EC) No 1211/2009).

The following analysis looks at the developments in the sector, in 2017, 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 key thinking from BEREC expert working group (EWG) activity, together with quantitative data, based on the two main periodic BEREC data collection exercises and on other public reporting documents.

2 Market trends

2.1. Economic context

At the end of 2015, based on data collected and published by the European Commission for its Digital Agenda Scoreboard report¹, the electronic communications sector in Europe was worth just a little more than EUR 300 billion.

The value of the sector remained practically flat in the 12 months from December 2014, decreasing by 0.2% in that period, compared with a decline in revenues of 2.7% in the preceding 12 months (December 2013-December 2014). This also represented an almost 9% decline in revenues to the sector since 2010. The data gathered by the European Commission indicated that 13 of the EU-28 Member States experienced growth in telecoms sector revenue in the period under analysis.

Figure 1 shows that, between 2014 and 2015, revenue growth was particularly significant in Finland (+16%), the Czech Republic (+9.8%), and Lithuania (+3.2%), while revenue in the electronic communications sector declined significantly in Greece (–11.9%), Portugal (–8.3%) and Croatia (–7.2%) in particular, in that same period.

A basic interpretation of the data suggests that in the EU-28² approximately EUR 49 per capita per month was spent in 2015.

¹https://digital-agenda-data.eu/datasets/digital_agenda_scoreboard_key_indicators/visualizations

² The approximate 2015 population of the EU-28 was 508 million, based on Eurostat data; http://ec.europa.eu/eurostat/statistics-explained/index.php/Population_and_population_change_statistics#EU-28_population_continues_to_grow

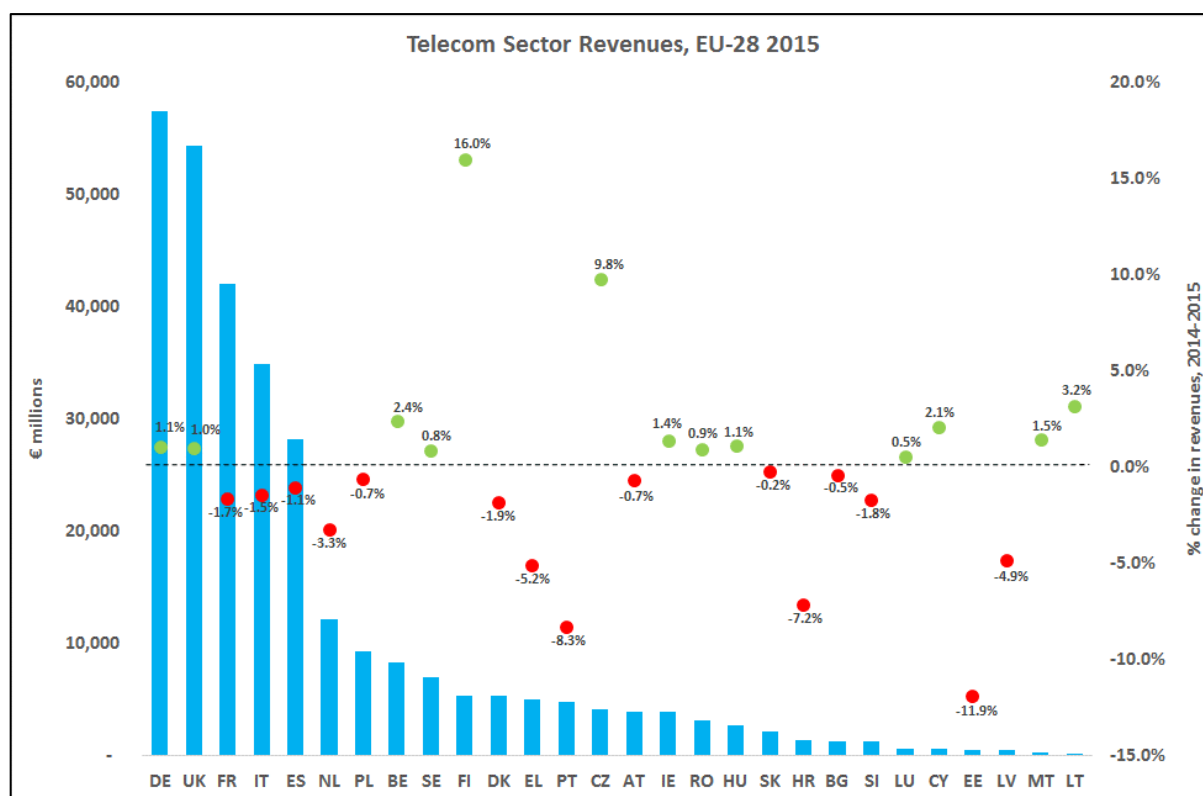


Figure 1: EU-28, telecom sector revenues in 2015 and percentage change 2014-2015.
Source: European Commission.

In addition to the data gathered by the European Commission, more recently the European Telecommunications Network Operators' Association (ETNO) released figures for 2017, based on a report³ prepared by IDATE Digiworld, the digital economy think-tank.

According to that report, telecoms sector revenue grew (albeit barely) by 0.1% in 2017, despite growing 'pressure for 5G and fibre deployment'. The report also showed that (despite the apparent ubiquity of mobile telephone usage in recent years) the revenue share of mobile services, compared with fixed services, has remained relatively stable. In 2011, the same report showed that fixed revenues accounted for 48% of all service revenues (covering fixed telephony, fixed broadband and mobile), with mobile revenues accounting for 52% in the EU-28. In 2017, fixed services revenues accounted for 49%, compared with a mobile services market share of 51%.

The historic data shows that there is an obvious variation in revenue performance across countries, illustrated above in Figure 1; that is, while 46% of the EU-28 experienced some form of revenue growth in 2015, 54% experienced a decline in revenues.

Similarly, inflation data (for the communications sub-component of the overall Harmonised Index of Consumer Prices (HICP)⁴ XXX) gathered by national statistical

³ [https://etno.eu/datas/publications/annual-reports/ETNO%20Annual%20Economic%20Report%202017%20\(final%20version%20web\).pdf](https://etno.eu/datas/publications/annual-reports/ETNO%20Annual%20Economic%20Report%202017%20(final%20version%20web).pdf)

⁴ <http://ec.europa.eu/eurostat/web/hicp>

offices in the EU-28 and published by Eurostat show that, over the 12 months to December 2017, 12 Member States (43%) experienced price stability (Slovakia showed 0.0% inflation) or positive inflation, while 16 Member States (57%) experienced price decreases.

Coincidentally, in 2016, the number of Member States experiencing negative and positive inflation was exactly the same as in 2017.

Looking at the overall basket of goods, the HICP itself, the average inflation for the EU-28 Member States, between December 2016 and December 2017, was +1.7%. In the previous year, this figure was +1%. In 2017, almost all Member States (with the exception of Cyprus, whose inflation was just –0.4%) experienced positive (or flat) inflation.

It is clear from the data that, while the price of the overall basket of goods is typically increasing across Europe, and over time⁵, the change in the price of the communications sub-component for consumers, on a country-by-country basis, has not been uniform.

Figure 2 illustrates the change in the overall HICP and the communications sub-component between December 2016 and December 2017.

The most notable reductions in communication prices for consumers were experienced in the Netherlands (–8.3%), Estonia (–5.3%), Hungary (–5.0%), and Luxembourg (–4.7%). By contrast, notable increases in communications prices for consumers were experienced in Lithuania (+1.5%), Romania (+1.4%), Greece (+1.4%) and Poland (+1.1%).

⁵ Over 75% of the EU-28 Member States experienced positive inflation in the overall basket of goods in 2016.

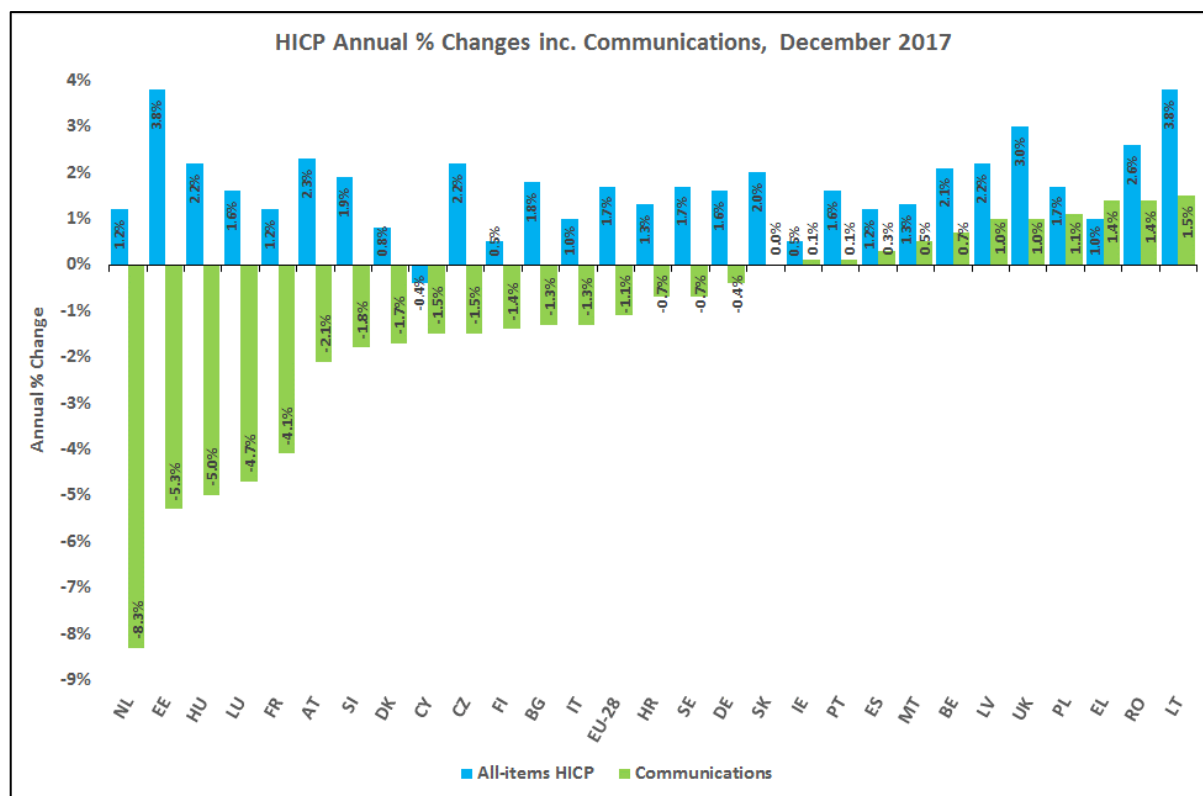


Figure 2: EU-28, annual percentage change (2016-2017) in HICP and the communications sub-component. Source: Eurostat, ONS.

Given the interesting symmetry in the charts above, showing an almost 50/50 split in the EU-28, at the overall European level, the decrease in communication prices in certain countries in the year to December 2017 outweighs the increase in other countries over the same period. One could conclude from this that, again at the European level, consumers overall benefit as they pay less for telecommunication services.

While the revenue and inflation data tell a story of ‘winners and losers’ in terms of the overall national perspective and how consumers in different Member States are affected by price fluctuations, the performance of the European telecommunications sector is evidenced rather clearly in Figure 3. This compares the performance of the telecommunications sector (STOXX Europe 600 Telecommunications Index⁶) with the performance of the overall STOXX Europe 600 Index⁷.

⁶ The STOXX Europe 600 Telecommunications Index offers exposure to the European Telecommunications sector as defined by the Industry Classification Benchmark (ICB). It is a sub-index of the STOXX Europe 600 Index, and is comprised of 21 publicly traded companies: Vodafone GRP, Deutsche Telekom, Telefonica, Orange, BT GRP, Telenor, Telia Company, Swisscom, Telecom Italia, KPN, Elisa Corporation, TDC, Proximus, Altice NV A, TELE2 B, Cellnex Telecom, Freenet, 1&1 Drillisch, Telefonica Deutschland, Sunrise and Inmarsat.

⁷ The STOXX Europe 600 Index is derived from the STOXX Europe Total Market Index and is a subset of the STOXX Global 1800 Index. With a fixed number of 600 components, the STOXX Europe 600 Index represents large, medium-sized and small capitalisation companies across 17 countries of the European region: Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.



Figure 3: 5-year performance of STOXX Europe 600 Telecommunications Index and STOXX Europe 600 Index. Source: <https://www.stoxx.com/index-details?symbol=SXKP>.

The data illustrated in Figure 3 show that, while the sector outperformed the overall cross-sector European index between 2013 and 2016 (albeit with the usual volatility to be expected in stock markets), more recent data suggest that the telecommunications sector underperformed in 2017.

Indeed, according to the STOXX Europe data, the value of the telecommunications sector in Europe has reverted to 2013 levels.

While reported revenues, financial statements and other operating data will clearly affect the share price performance of a company, additional factors will also affect share prices. For example, rumours or news of impending mergers will cause an adjustment in the share price of both the target company and the buyer.

2.2. Market players

According to an IDATE estimate, in 2017 total telecoms sector revenues for the EU-28 were approximately EUR 223 billion, based on growth of less than 1% on the previous year. European mobile operators account for 51% of this total revenue figure, while fixed telephony and fixed broadband account for 17% and 32% respectively.

In its 2016 *Annual Report*, BEREC reported on the top 10 operators by 2015 revenue in Europe. The list of operators (and their countries of origin) included (among others) Deutsche Telekom (Germany), Vodafone (the United Kingdom), Telefonica (Spain), Orange (France) and BT (the United Kingdom). ETNO, in its 2017 *Annual Economic*

*Report*⁸ ranked the top 20 European telecom operators. Based on this more recent list of top European telecom operators, Figure 4 charts the top 10 based on total revenue and percentage change on 2016 revenues.

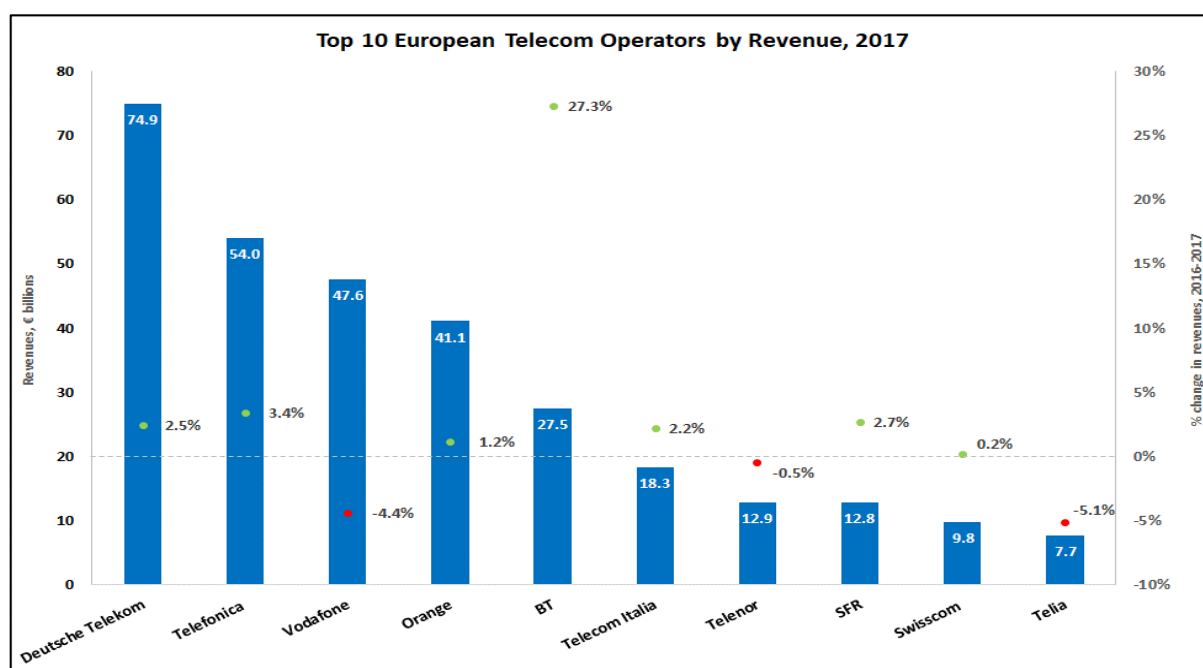


Figure 4: Top 10 European telecom operators by revenue, 2017.

The data presented in Figure 4 is based on the most recent financial statements released by the operators shown.

The 2017 financial results for Deutsche Telekom (DT)⁹ showed that its revenues (EUR 74.9 billion) increased by more than 8% on 2015, and indeed by 2.5% on 2016. DT's net profit grew by 29% in 2017 to EUR 3.5 billion. Telefonica too, based on its 2017 financial results¹⁰, posted strong revenue growth as of 31 December 2017, with growth of 3.4% versus negative growth (of -0.1%) in the previous year. The operator that returned the most impressive revenue performance in 2017 was BT; its 31 March 2017 financials¹¹ showed revenue of EUR 27.5 billion, based on growth of 27.3%¹² on 2016.

Of the top 10 European telecom operators analysed in Figure 4, only Vodafone, Telenor and Telia showed negative revenue performance, -4.4%, -0.5%, and -5.1% respectively.

Beyond Europe, ETNO, in its *Annual Economic Report* also listed the top 50 global communications providers by revenue. The United States (AT&T and Verizon), China

⁸ [https://etno.eu/datas/publications/annual-reports/ETNO%20Annual%20Economic%20Report%202017%20\(final%20version%20web\).pdf](https://etno.eu/datas/publications/annual-reports/ETNO%20Annual%20Economic%20Report%202017%20(final%20version%20web).pdf)

⁹ <https://www.telekom.com/en/media/media-information/archive/annual-figures-2017-515644>

¹⁰ <https://www.telefonica.com/documents/162467/138879215/rdos17t4-eng.pdf/d3fa278f-818b-ad1e-8094-3c669f7a0155>

¹¹

https://www.btplc.com/Sharesandperformance/Annualreportandreview/pdf/2017_BT_Annual_Report_sm art.pdf

¹² The results for the period include EE, which BT acquired on 29 January 2016.

(China Mobile and China Telecom) and Japan (NTT and Softbank) all had two operators in the top 10 of this ranking, while three European operators (DT, Telefonica and Vodafone) were included in the global top 10. The operator completing the top 10 in this ranking was Mexico's America Movil. In total, these 10 operators accounted for almost EUR 800 billion, of which the three European operators generated 21.7%. The US operators accounted for 33% of the top 10 global communications operators' revenue, while Japan and China generated 21% and 18% respectively.

Based on data presented in BEREC's biannual termination rates report (*Termination rates at European level July 2017*¹³), it appears that a number of the operators held substantial market share (in terms of fixed and/or mobile subscriptions) in their domestic markets. Among the three major European operators, Telefonica for example holds a 45.6% market share of Spanish fixed broadband services market, representing over 5.9 million lines, and 28.9% market share of Spanish mobile network services market, representing 15.7 million mobile subscriptions.

Similarly, these three major operators maintain strong presences in many European countries. The top three European operators (on the basis of revenues) for example compete directly in the Czech Republic mobile market.

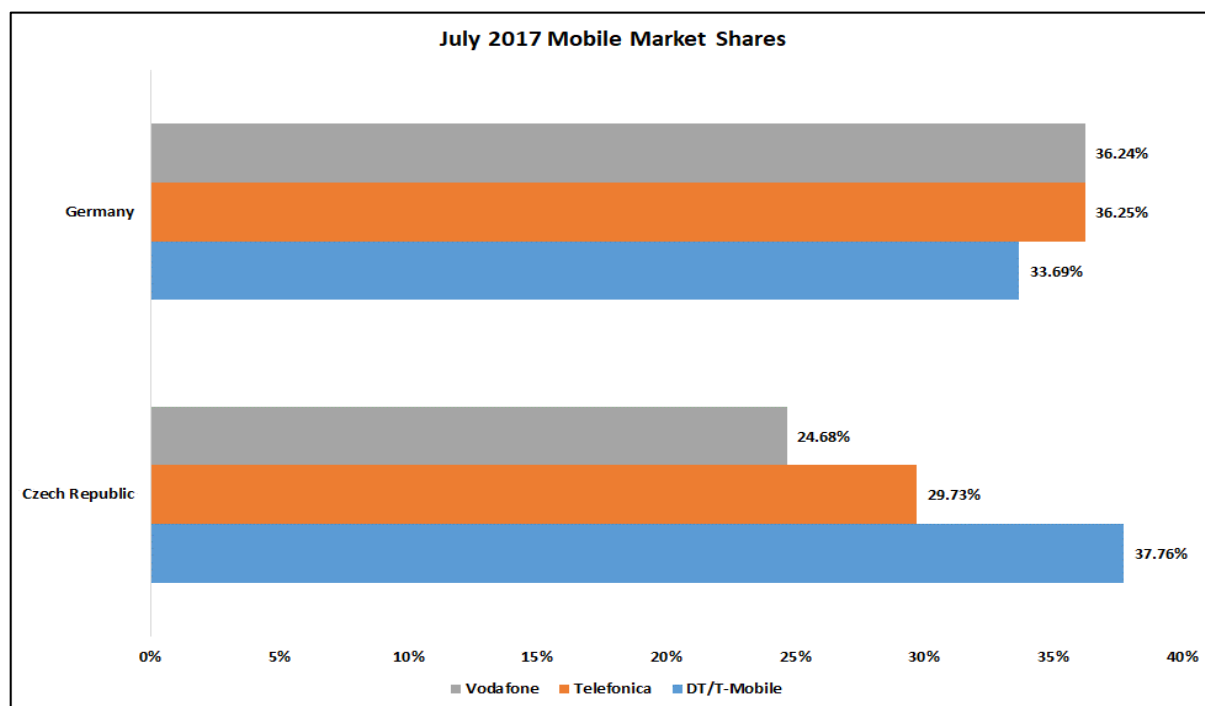


Figure 5: DT/T-Mobile, Telefonica, Vodafone mobile market shares, July 2017.

In addition, two of the 'smaller' top 10 operators shown in Figure 4 also compete in different countries, with a focus on the Scandinavian market. Telenor (Norway) and Telia (Sweden) enjoy high market share in the fixed and mobile sectors in their own domestic markets and also competing in Denmark. Figure 6 shows where these two operators compete directly in both the fixed and mobile sectors.

¹³ BoR (17) 227.

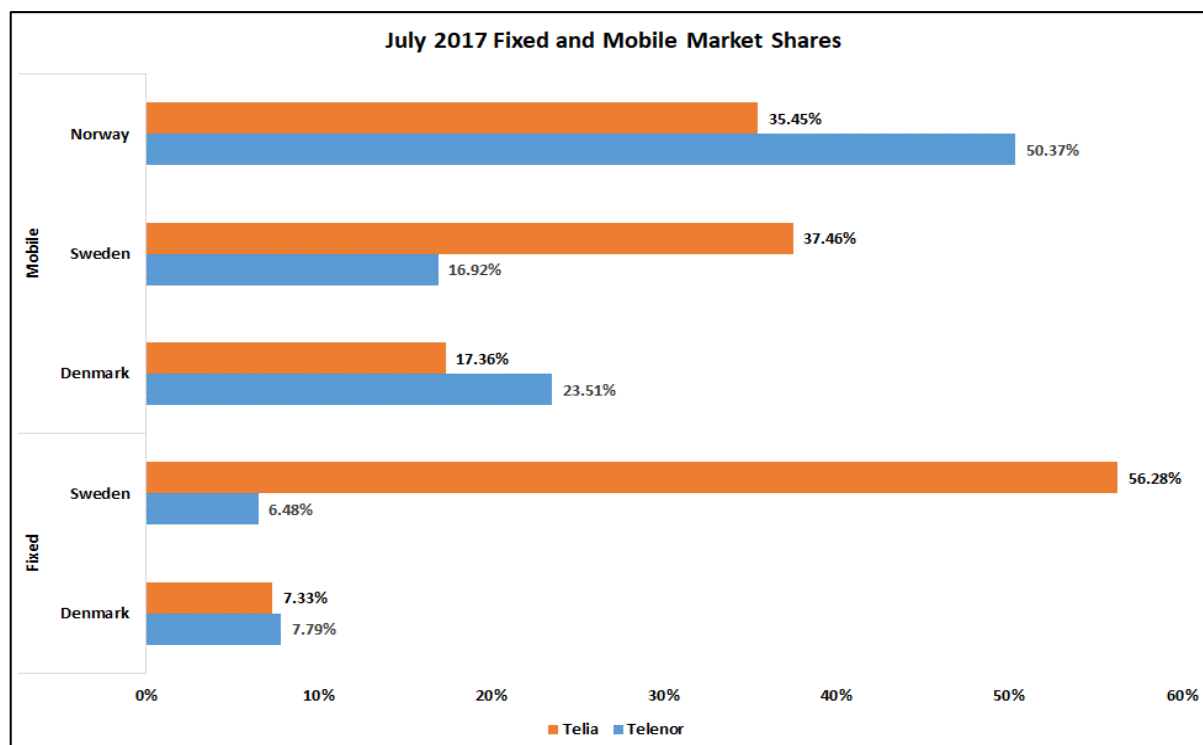


Figure 6: Telenor and Telia fixed and mobile market shares, July 2017.

In the fixed sector, based on data published in BEREC's report on termination rates at European level (July 2017), Telenor and Telia are competing in these countries, albeit with relatively lower market shares in the Danish fixed market.

Regarding the mobile sector Telenor and Telia are competing in Norway, Sweden and Denmark. Both operators have larger market shares in their respective domestic markets, with Telenor attracting more than half of mobile subscriptions in Norway, while Telia accounts for just below 40% of mobile subscriptions in Sweden. However, the rival operator in both countries maintains a relevant market share, with Telia holding 35% of the mobile market in Norway and Telenor accounting for approximately 17% of the mobile market in Sweden.

2.3. Mergers and acquisitions

Consolidation through mergers and acquisitions (M&A) continued in the European electronic communications services (ECS) markets in 2017, although at a slower pace than in previous years. This consolidation process involved both mergers in the same markets (either fixed or mobile) and fixed/mobile mergers. The latter are motivated by competition in a convergent scenario where telecommunication operators provide bundled and integrated services over their own fixed and mobile infrastructures.

In most cases, the mergers have been national in scope, implying that a majority of concentration operations aimed to strengthen a firm's market position in a European national market, rather than to extend its footprint to cover additional countries.

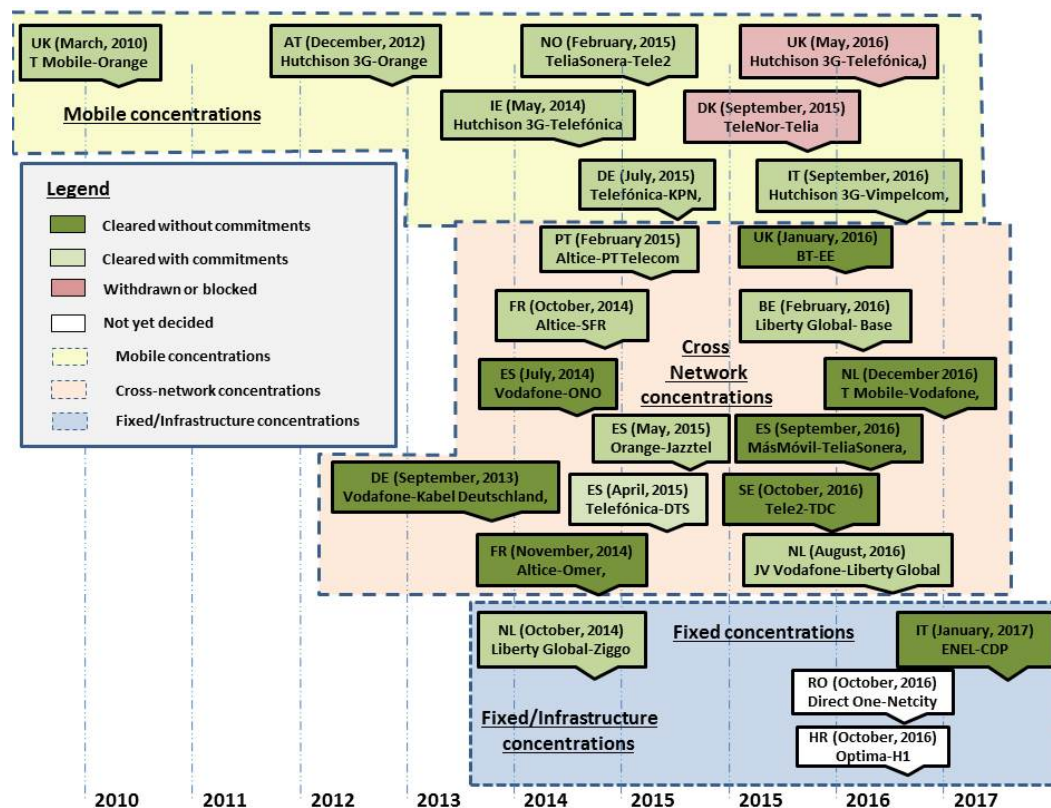


Figure 7: Mergers and acquisitions in Europe 2010-2017.

Figure 7 shows that almost all of the M&As were cleared by relevant competition and regulatory authorities, although many of them were subject to specific commitments designed to ensure that effective competition would not be significantly reduced as a result of the concentration.

The mobile sector went through a period of intense M&A activity in 2010-2016. The parties involved in some of these mergers were mobile network operators commercialising similar mobile services within the same country. As shown in Figure 7, six of these transactions were cleared in the EU between 2010 and 2016, one was withdrawn in 2015 (Denmark) and another was blocked in 2016 (United Kingdom). No mergers among mobile network operators took place or were notified in 2017.

Most of these transactions resulted in the number of operators falling from four to three (specifically, the M&As in Austria in 2013, Ireland in 2014 and Germany in 2015). The M&As notified in Denmark and the United Kingdom that were subsequently blocked by the authorities were also of this class.

The European Commission has cleared most of the M&As, conditional on commitments proposed by the merging parties. These commitments, which were initially related to opening the merged network to mobile virtual network operators, have evolved to include measures to facilitate the potential entry of a new player to replace the fourth operator.

In fact, the most recent concentration cleared by the Commission in 2016, the acquisition of Wind (formerly owned by Vimpelcom) by Hutchinson, was cleared conditional on the divestiture of spectrum, sharing or selling base stations and coming

to a national roaming agreement with Iliad, which is to be the new fourth operator in Italy, maintaining a four-player market structure in this country. Conversely, the M&As that were not cleared (Hutchinson 3G-Telefónica in the United Kingdom and TeleNor-Telia in Denmark) failed to fulfil this requirement on enabling a new entry.

In 2017, the Commission approved Vivendi's acquisition of Telecom Italia, subject to conditions. The Italian regulator, AGCOM, found Vivendi in breach of the Italian legislation on media plurality by exceeding the national concentration limits, as a consequence of the shares owned in Telecom Italia S.p.A. and Mediaset S.p.A. Vivendi was thus ordered to take appropriate steps in order to comply with the relevant law within the following 12 months. In September 2017, Vivendi submitted to the Italian regulator measures aimed at removing the position. The national regulatory authority will monitor the correct implementation of the plan.

In Europe, cross-network concentrations can be classified into three categories depending on the operators that are involved: first, mobile operators that have acquired fixed operators (e.g. Vodafone's 2013 acquisition of Kabel Deutschland in Germany); second, fixed operators acquiring mobile operators (Liberty Global's 2016 acquisition of Base in Belgium); and, third, the creation of a joint venture between fixed and mobile operators (e.g. the deal that Vodafone and Liberty Global signed in the Netherlands in 2016).

These M&As allow operators to address rising consumer demand for bundled ECS (ranging from standard fixed telephone and broadband packages to more complex packages that include mobile telephony and pay TV). By basing their retail strategies on bundled services, operators are able to increase average revenue per user while simultaneously reducing the churn of their client base and extending the average customer lifespan.

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 France, Spain and the United Kingdom) and some by the European Commission (all others).

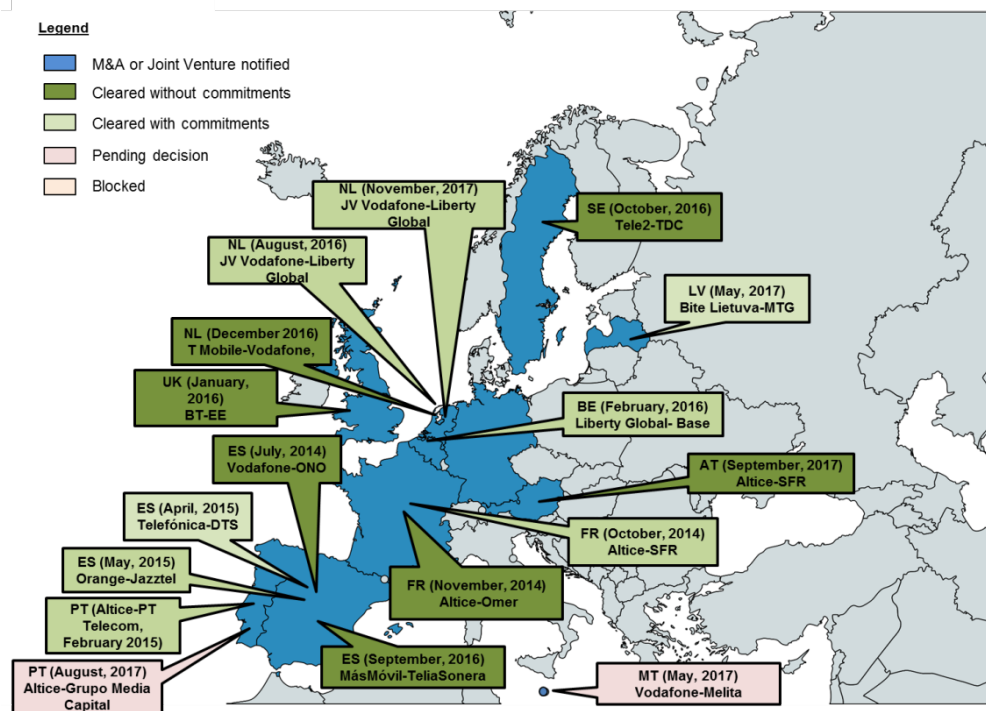


Figure 8: Cross-network consolidation throughout Europe (2014-2017).

To date, the competition/regulatory authorities have cleared all cross-network M&As; however, in some cases in which there were concerns about horizontal overlapping, they have been subject to divestiture remedies. It is also interesting to note that M&As involving ECS operators and media firms are becoming more common, such as the mergers between Telefónica and DTS in Spain (2015), Bite Lietuva and MTG Broadcasting in Latvia (2017) and MEO/Altice and Grupo Media Capital in Portugal (2017). The mergers in Spain and Latvia were cleared by the national competent authorities with commitments, which include the establishment of wholesale offers of audio-visual content.

- Investment

The previous sections of this report have illustrated that, as revenue growth, at the macro level, has declined across the European telecommunications sector in the past decade, operators have looked to consolidate through M&A activity. Given the ever-increasing demand for telecommunications services and (as evidenced previously) the experience of diminishing revenues overall, this section of the report focuses on the extent to which operators are investing despite the difficult economic conditions they face.

The European Commission collects data, annually, on investment in the telecommunications sector. Figure 9 primarily illustrates the growth in investment between 2014 and 2015, but it also shows how investment has changed in the 5 years to 2015. While investment has decreased overall since 2010, the data shows that for

the EU-27¹⁴ Member States, investment actually grew by 6% in the 12 months of the most recent data available to the European Commission.

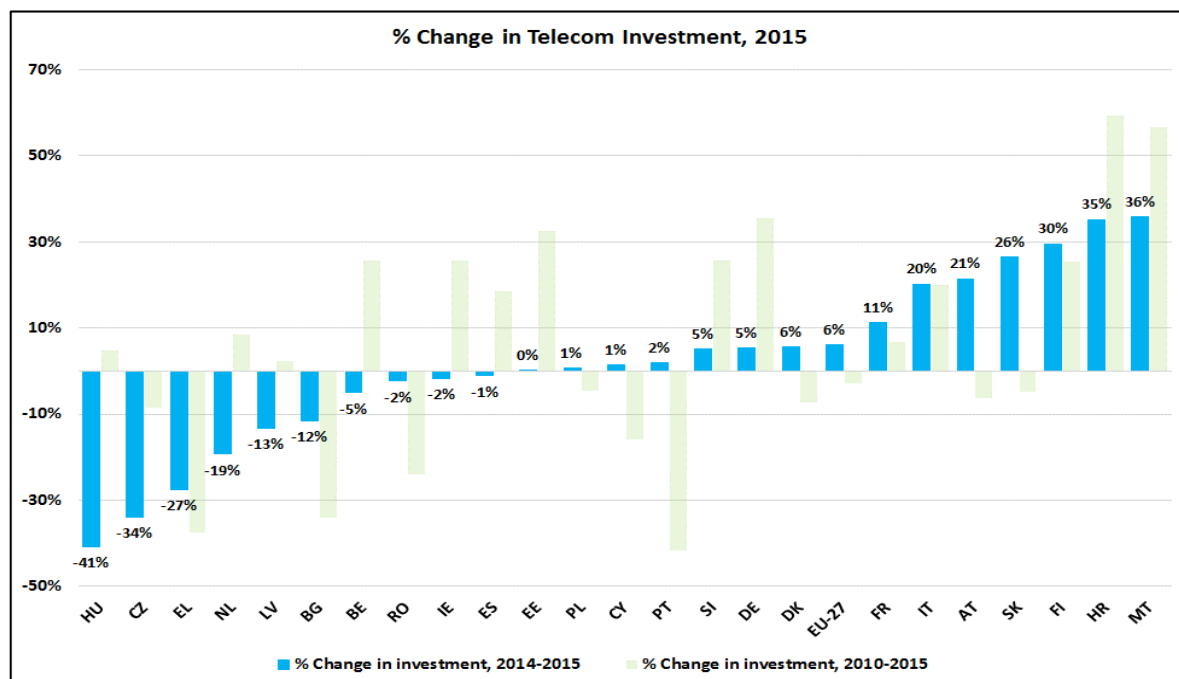


Figure 9: Percentage change in telecom investments, 2014-2015 and 2010-2015. Source: European Commission.

The investment growth data presented in BEREC's 2016 *Annual Report* showed that Latvia, the Czech Republic, Spain and Hungary had all experienced positive investment growth between 2013 and 2014. In the same report, it was stated that Croatia, Portugal, Finland and Poland all experienced negative investment growth between 2013 and 2014. Interestingly, for each of those eight countries, the opposite direction of investment growth was experienced in 2015.

Croatia (+35%) and Finland (+30%), in particular were among the leaders in terms of investment growth, while both Portugal (+2%) and Poland (+1%) experienced positive growth, albeit at much lower levels. On the other hand, investment in Hungary (−41%) and the Czech Republic (−34%) declined significantly on the previous year, while the reductions in Latvia (−13%) and Spain (−1%) were less pronounced.

In general, according to the data collected by the European Commission, European operators appear to be investing more, despite declining revenues. Figure 10 represents the investment data by comparing investment to revenues over time.

While actual investment levels in 2015 were back to levels previously reported in 2009, the investment as a percentage of revenues metric had increased by 1.4 percentage points (p.p.). Based on individual country data, over the period of this analysis (2009-2015), a number of Member States showed significant increases in investment as a percentage of revenues: Estonia (+7.8 p.p.), France (+7.5 p.p.) and Italy (+6.7 p.p.).

¹⁴ The United Kingdom did not provide data.

A number of Member States experienced a decline in this metric in that same timeframe: Slovenia (–5.8 p.p.), Greece (–5.1 p.p.) and Cyprus (–4.1 p.p.).

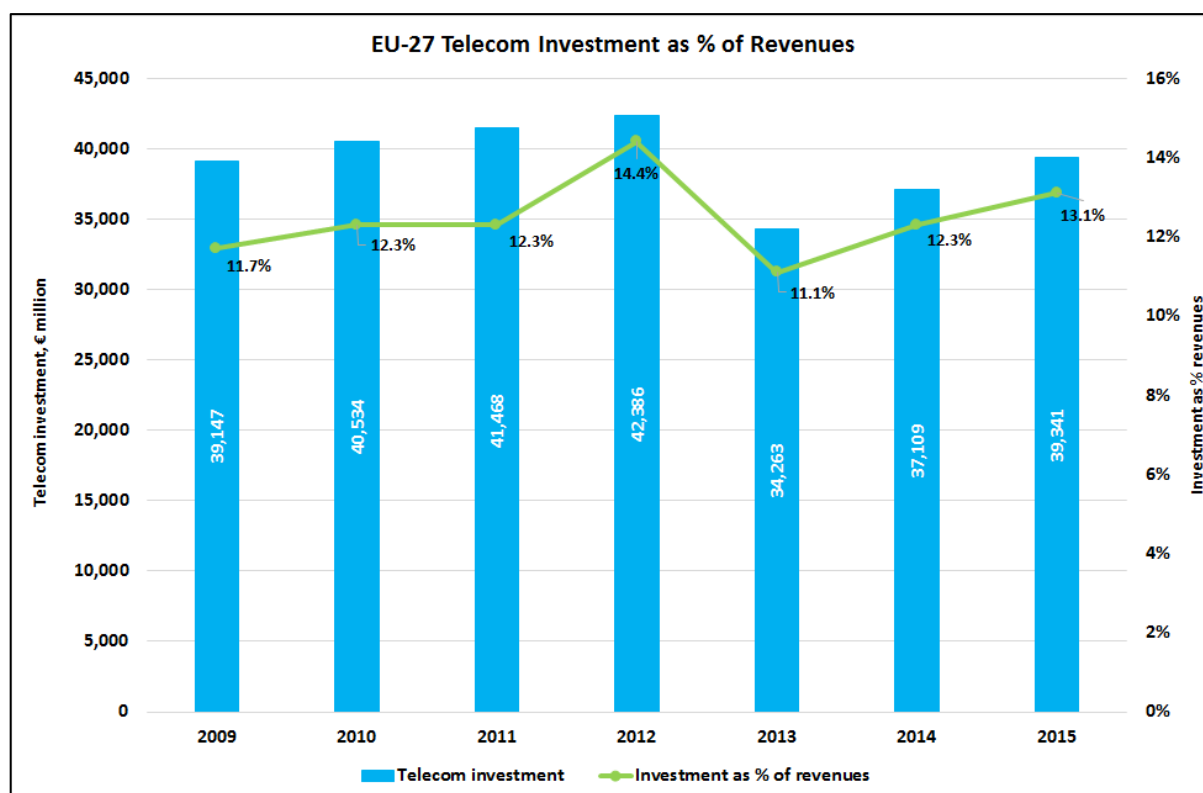


Figure 10: Overall telecom investment and investment as a percentage of revenues. Source: European Commission.

Comparing the magnitude of telecom investment to overall GDP for those EU countries that provided such investment data to BEREC for 2016 shows that total investment in the sector represented less than 0.5% of GDP for those 25 Member States¹⁵.

2.4. Broadband and next-generation take-up

Fixed broadband penetration in the EU-28 countries reached, on average, 33.7 per 100 inhabitants in July 2017, up from 30.5 a year earlier, while the Organisation for Economic Co-operation and Development (OECD) area average is around 30.6 per 100 inhabitants. Sweden, Cyprus and Malta had the highest year on year growth, with respective growth rates of 3.9 p.p., 2.4 p.p. and 2.1 p.p. Considering OECD countries, Switzerland leads with a penetration rate of 45.8 subscriptions per 100, while within the EU-28, the Netherlands (43.7%), Denmark (43.6%) and France (42.3%) have the highest penetrations, well above the EU average.

Mobile broadband is the faster-growing segment of the broadband market. In July 2017, almost 90.2% of EU-28 inhabitants used mobile broadband, 6.4 p.p. more than 1 year earlier and up from 33% 4 years ago. The OECD area average is even

¹⁵ Total GDP for the European Union in 2016 was approximately EUR 15.3 trillion. For the 25 Member States that provided investment data to BEREC, GDP was approximately EUR 12.5 trillion in 2016.

higher, having increased by 6.7 p.p. in the year, taking mobile broadband penetration to over 100% in the OECD area for the first time.

Within the EU-28, in the Nordic countries, Poland, Estonia, Cyprus and Luxembourg there are more than 100 subscriptions per 100 inhabitants, while in Hungary the take-up rate is below 50%.

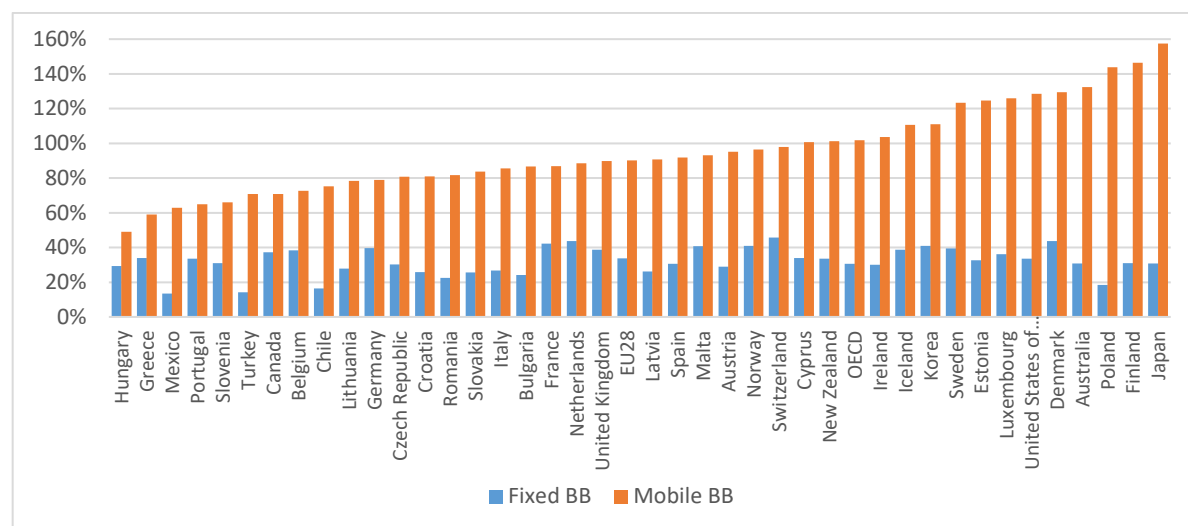


Figure 11: Fixed and mobile broadband penetration (subscriptions per 100 inhabitants) in July 2017.

Source: European Commission and OECD.

Note: Estimated data for Luxembourg, Switzerland and the United States.

DSL (digital subscriber line) technologies remained the main form of fixed broadband internet access in the EU-28 (64.2% of broadband access) although their share is gradually declining (–9.1 pp over a 4-year period). As we have seen in recent years, access is migrating from DSL to high-speed technologies, in particular fibre (FTTH/B), which accounts for 4.4 million more subscribers in the EU-28 than in July 2016.

FTTH/B made up around 13% of all connections in July 2017, up from 5.6% in July 2013, while cable continued to show steady growth, from 17.7% in July 2013 to 19.4% in July 2017. Driven by Japan and Korea, in the OECD area fibre technology accounted for, on average, 22.3% of total fixed broadband subscriptions. Overall, the main access technology in OECD countries in July 2017 is also DSL, although at a lower proportion than the EU figure.

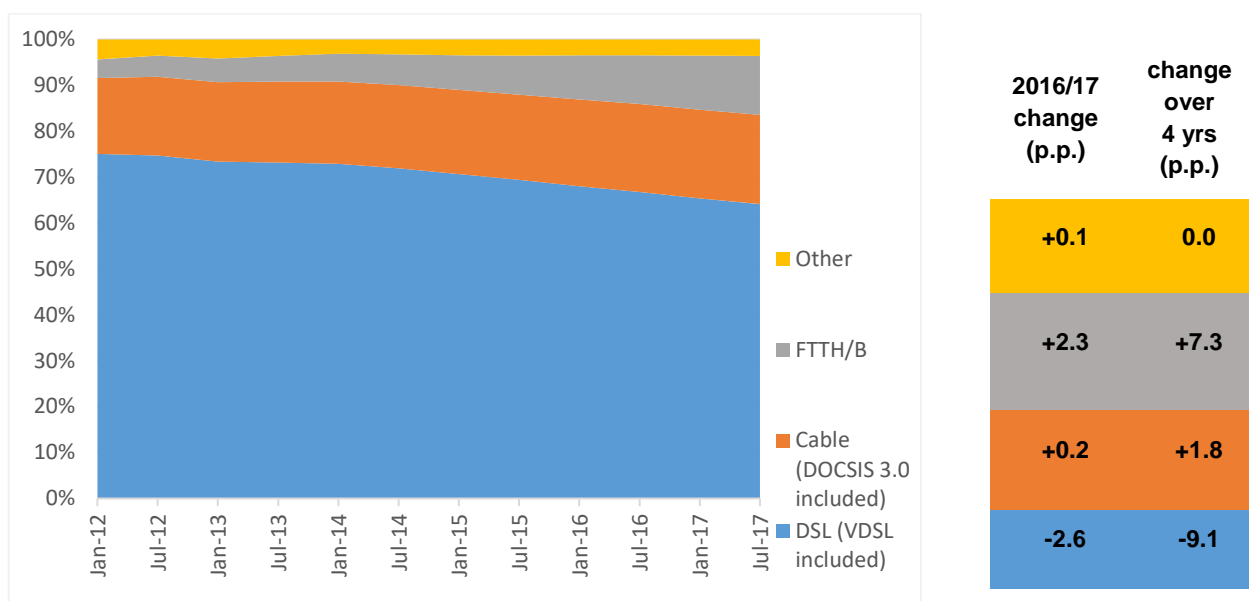


Figure 12 – Change in the share of broadband connections by technology in the EU-28
Source: European Commission

Across European countries, there are significant differences in technology breakdown. Figure 13 shows the diffusion of broadband services in EU-28 based on all of the available wireline broadband technologies. FTTH is the main access technology in seven countries (Bulgaria, Estonia, Lithuania, Latvia, Portugal, Romania and Sweden) while cable modem dominates in Belgium, Hungary, Poland, the Netherlands and Malta. DSL technologies are still dominant in 57% of the countries.

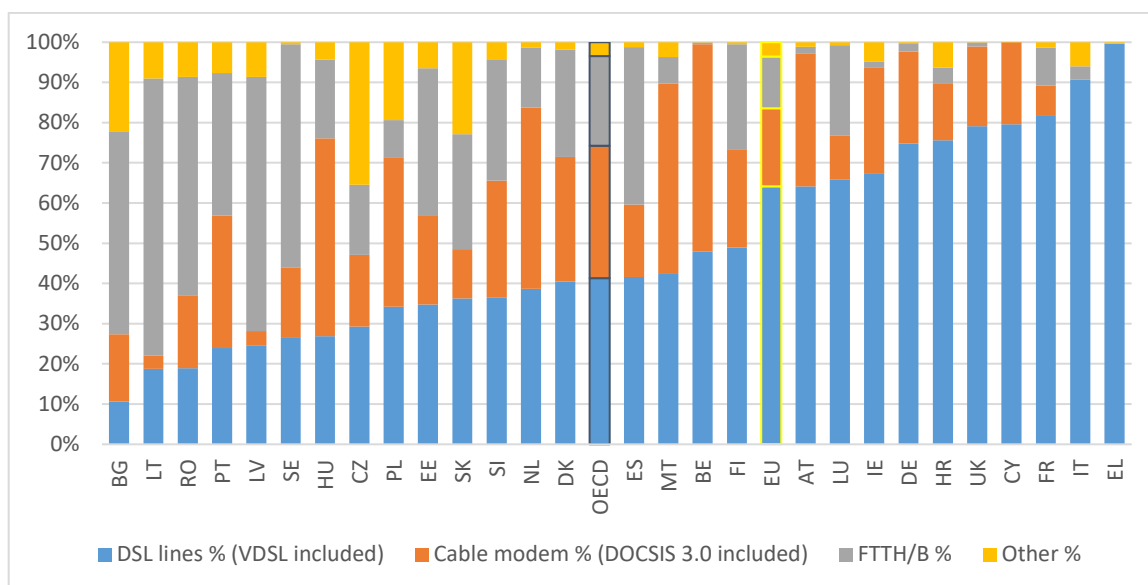


Figure 13: Fixed broadband subscriptions by technology in July 2017
Source: European Commission and OECD.

Today, advertised download speeds in the EU reach 1 Gbps in a number of countries (France, Portugal and the United Kingdom, among others) with only a small number of consumer offers available at that level. It may take some years for such speeds to become widely available in all countries. Moreover, delivering such speeds to all geographical locations remains a challenge, which is one of the reasons why average speeds vary substantially across EU countries. According to Akamai, the difference in average connection speeds between Sweden and Cyprus, the fastest and slowest countries in the EU-28, was around 16 Mbps in 2017 Q1. Furthermore, 24 out of the 28 countries had average connection speeds above 10 Mbps.

Sweden had the highest average peak connection speed among EU-28 countries, followed by Romania and Switzerland, with a speed of at least 90 Mbps. Twenty-five countries had average peak connection speeds higher than 50 Mbps.

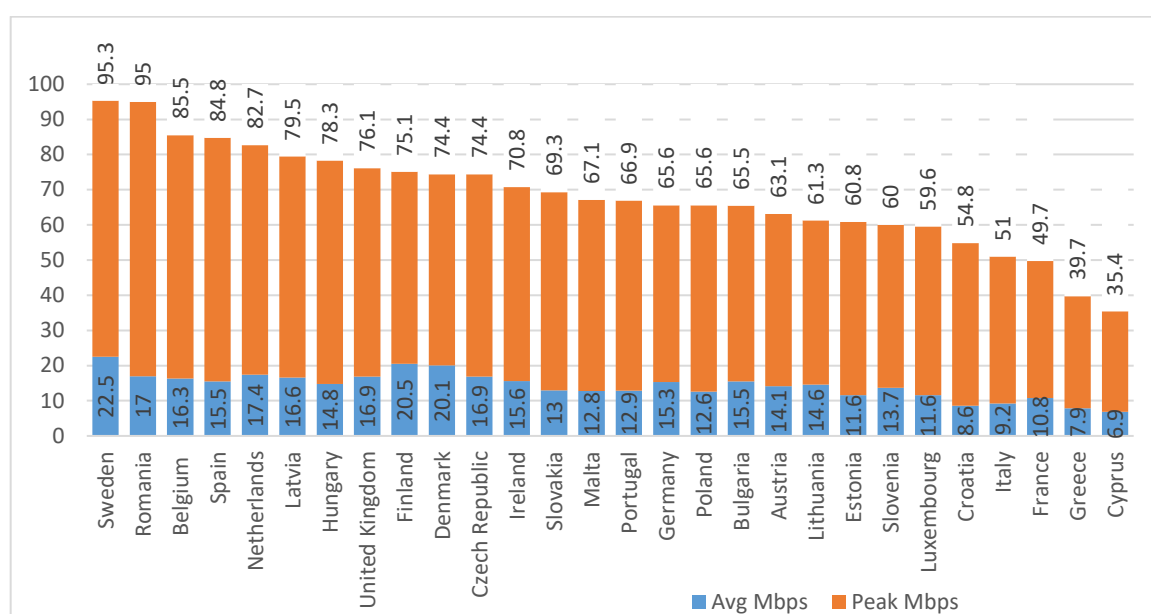


Figure 14: Average connection speed by European country

Source: Akamai (2017), Akamai's state of the Internet report: Q1 2017 report.

Note: Average connection speed (IPv4) and average peak connection speed by European country.

Next-generation access (NGA) take-up registered positive growth across the EU in 2017. Although the stock of fixed broadband lines (supported by all technologies) grew at an annual rate of 4% in the period between July 2013 and July 2017, the demand for NGA subscriptions grew even more quickly, at an annual rate of 30%.

Fast and ultrafast broadband penetration reached, on average, 15 per 100 inhabitants, as of July 2017, +3 p.p. compared with July 2016. Figure 15 shows the average EU-28 NGA penetration increase in the past 6 years, from 1.2 to 15 per 100 inhabitants for subscriptions with at least 30 Mbps and from 0.1 to 6.9 per 100 inhabitants for speeds of at least 100 Mbps.

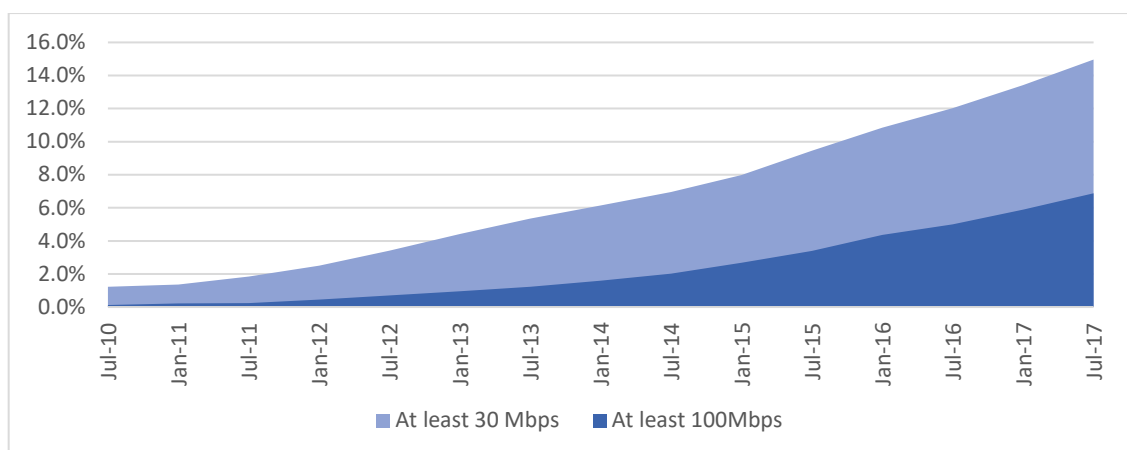


Figure 15: Fast and ultrafast broadband penetration (subscriptions as a percentage of population)

Source: European Commission.

The penetration of NGA broadband connections rose by 5 p.p. in July 2017, equivalent to 48% of all broadband connections in the EU. Since July 2016, the largest increase has been observed among broadband subscribers in Estonia (+14 p.p.), followed by an 11 p.p. increase in Germany.

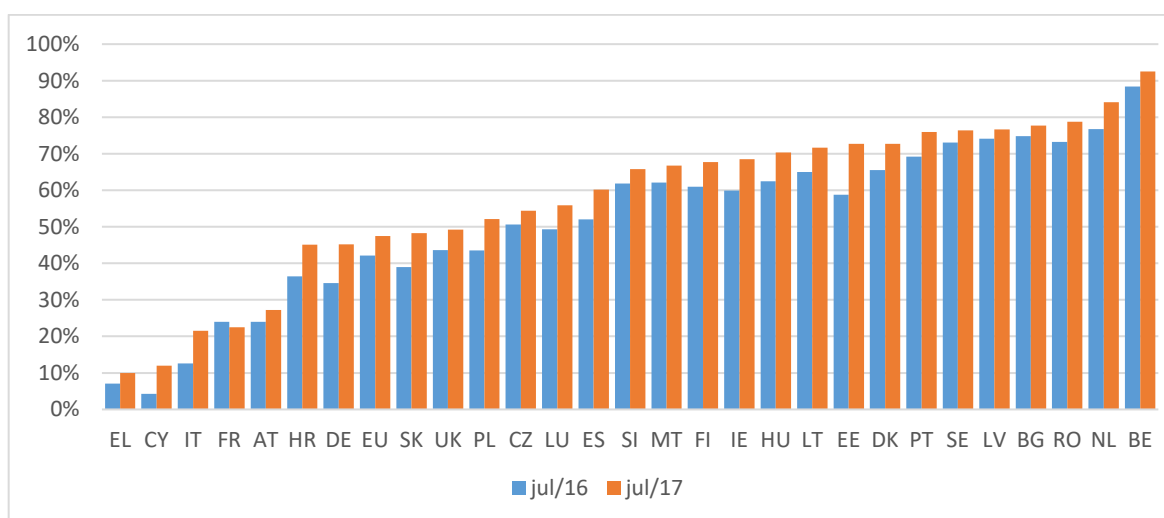


Figure 16: NGA take-up (as a percentage of total fixed broadband subscriptions), July 2016 and July 2017

Source: European Commission.

Note: NGA includes FTTH, FTTB, VDSL, Cable Docsis 3.0 and other.

Many of those NGA connections have been contracted as very-high-speed connections (i.e. connections providing actual speeds of at least 30 Mbps). By July 2017, on average in the EU-28, 44% of broadband lines were at least 30 Mbps and 20% were at least 100 Mbps.

Since 2011, the share of NGA subscriptions (subscriptions with at least 30 Mbps) grew at an annual rate of 6.3%, and the share of subscriptions with at least 100 Mbps has doubled in 2 years.

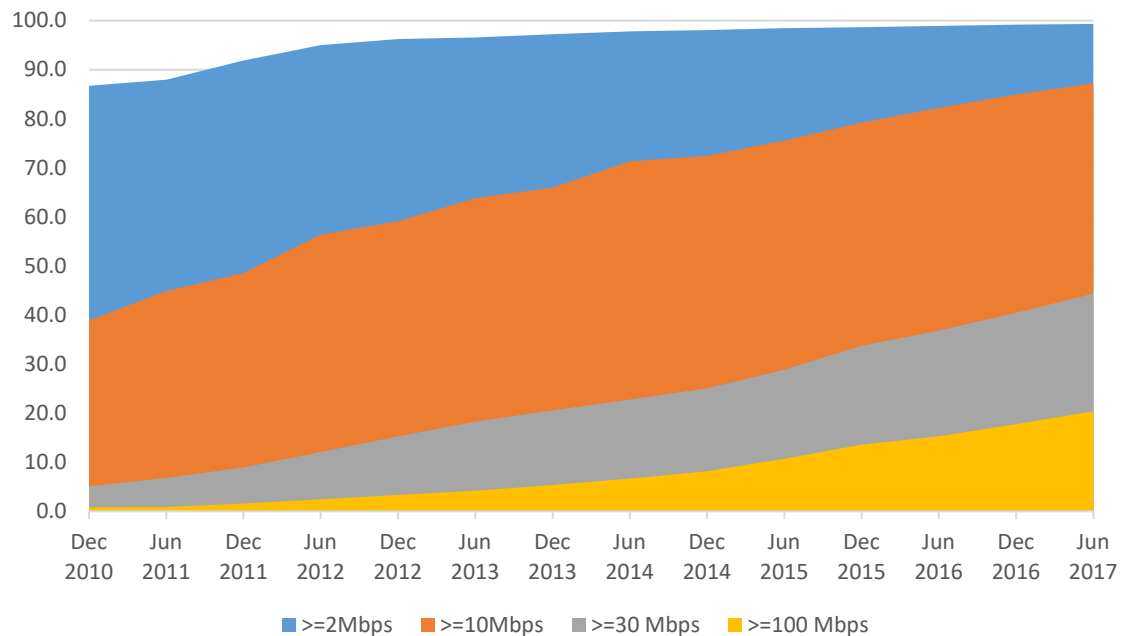


Figure 17: Broadband subscriptions by download speed.

Source: European Commission.

In 12 EU-28 countries, more than 60% of fixed broadband subscriptions are already at least 30 Mbps, while less than 12% of subscriptions in Cyprus and Greece are at least that speed. In ultrafast broadband (at least 100 Mbps), Sweden and Romania show the highest rates, with ultrafast broadband accounting for more than 60% of subscriptions.

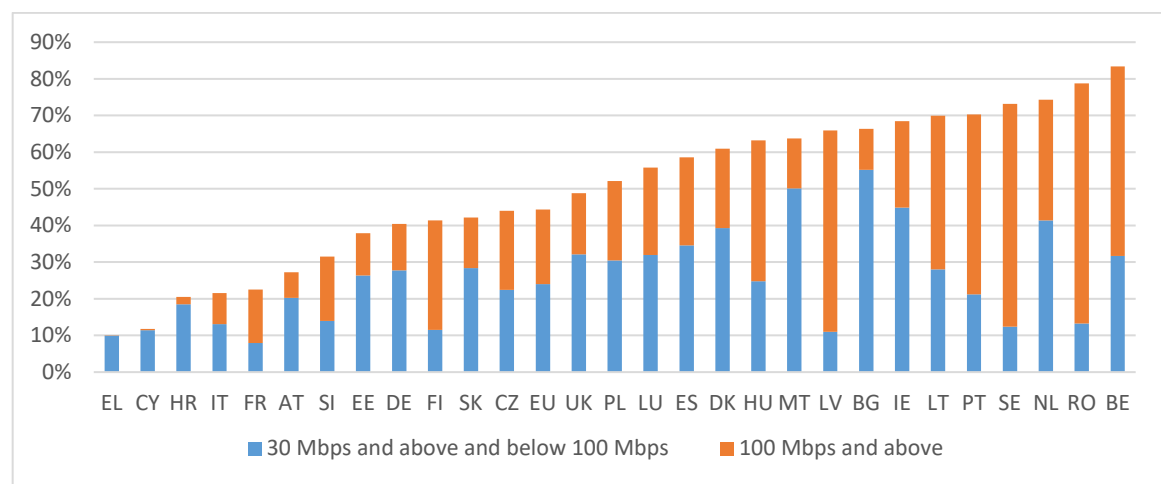


Figure 18: Fixed broadband subscriptions by speed.

Source: European Commission.

2.5. Mobile broadband

The latest updated Communications Committee (COCOM) data shows that mobile internet penetration grew by 6.4 p.p. in the year to June 2017, taking EU-28 average mobile broadband penetration to 90.2%, still below the OECD average, which this year surpassed the barrier of 100% (101.8%). The fastest growth in penetration was seen in Poland (+29% to 142.2%) followed by Malta (+25% to 93.2%), and Austria (+18% to 95.2%). In July 2017, there were eight countries in the EU with penetration rates above 100%, with the highest rate being in Finland (146.3%).

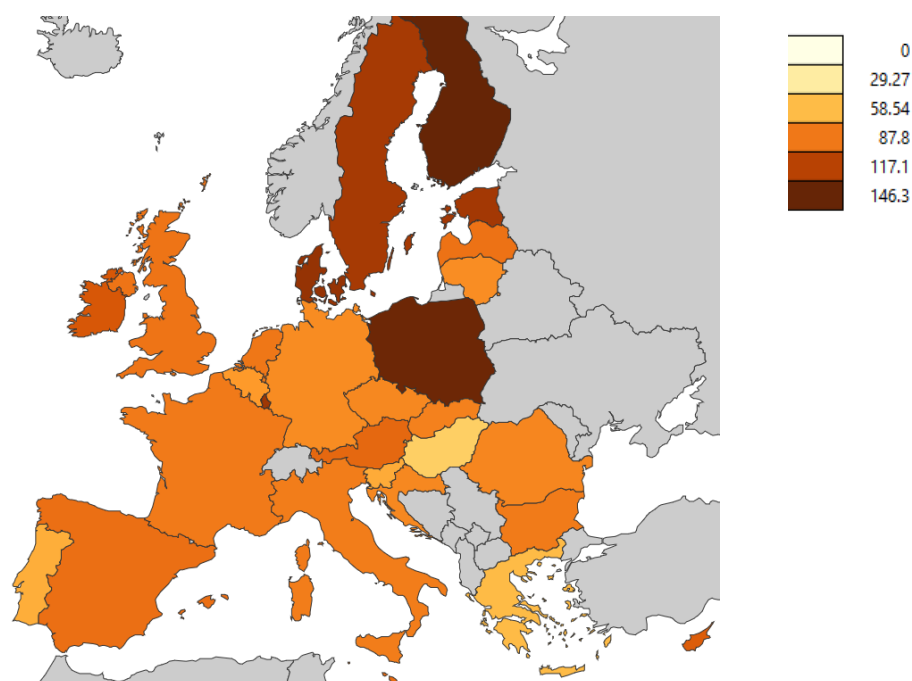


Figure 19: Mobile broadband (subscriptions/100 people) in July 2017.
Source: European Commission.

The key drivers behind this growth include increasing the population coverage of 3G and 4G networks, more affordable smartphones and data tariffs, and a growing young population with increasing digital skills, as well as an increasing willingness to consume social media and a range of services and content online.

Smartphone use continues to grow and the GSMA¹⁶ estimated that smartphone adoption will grow by 11 p.p. in Europe between 2017 (70%) and 2025 (81%); by then, three in four mobile connections will operate on smartphones. Smartphones will become the leading handset type by 2020.

Entertainment content (e.g. movies, music, games and sports), e-commerce and content (i.e. financial services and health, education and government services) are becoming the main services accessed by smartphones. In fact, many subscribers use

¹⁶ GSMA, *The Mobile Economy 2018*.

their smartphones on a regular basis to access these services and not only for internet-based messaging and social media.

The growing use of these services and interactive applications illustrate the dynamism of the telecom market and drive consumers' willingness to pay for internet services. According to the GSMA, research shows a significant correlation between application usage intensity and willingness to pay for internet access.

Driven by increasing smartphone subscriptions and increasing average data volume per subscription, fuelled primarily by more viewing of video content, mobile data traffic continues to increase. According to Ericsson¹⁷, global mobile data traffic for all devices will increase eight-fold between 2017 and 2023, reaching 110 exabytes per month. Smartphones will account for close to 95% of total mobile data traffic by 2023. Data consumption for an average smartphone user in Western Europe is 4.1 GB per month, and it is expected to increase by 2023 to 28 GB of mobile data per month, at a compound annual growth rate (CAGR) of 38%. In Central and Eastern Europe, it is expected to reach 19 GB per month in 2023 (31% CAGR).

Along with the increase in mobile broadband connections, a progression in mobile technology is expected. Over the past year, there has been impressive growth in 4G adoption, and 5G connections in Europe are expected to reach 214 million in 2025, representing an adoption rate of 31%. At the end of 2016, there were 226 million 4G connections in Europe (up 46% year on year), accounting for more than one third of total connections. 4G connections will reach 61% of total connections by 2020, with potential for speeds above 1 Gpbs. Meanwhile, Europe will continue to make progress with 5G deployment, with 5G expected to account for more than 30% of connections in Europe in 2025.

2.6. Termination rates

BEREC constantly monitors domestic¹⁸ termination rates (TRs) in Europe and provides an overview report twice a year on fixed termination rates (FTRs), mobile termination rates (MTRs) and SMS TRs.

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

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

¹⁷ <https://www.ericsson.com/assets/local/mobility-report/documents/2017/ericsson-mobility-report-november-2017.pdf>

¹⁸ Referring to calls originating and terminating in the same EU country.

2.7. 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, 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. As shown in Figure 20, wholesale interconnection rates for mobile telephony services in Europe fell markedly between January 2004 and July 2017: the simple average (Avg (S)) fell from 14.08 to 1.06 cents per minute, while the weighted average (Avg (W)) fell from 14.47 to 0.93 cents per minute¹⁹.

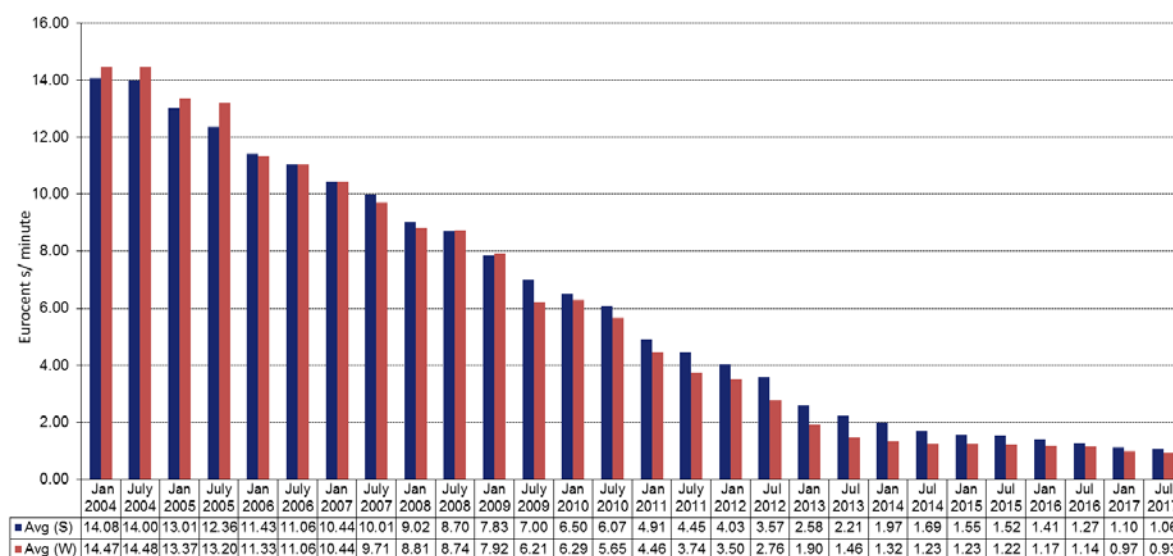


Figure 20: Average MTR: time series of simple average and weighted average at European level.

Source: BEREC, Termination rates at European level July 2017.

The simple average MTR at EU level (EU Member States only) stands at 0.88 cents per minute, whereas the weighted average at EU level is estimated at 0.91 cents per minute.

For July 2017, individual Member States' and observers' average rates²⁰, together with European and EU simple and weighted averages, are shown in Figure 21.

¹⁹ In the BEREC periodic MTR 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 (over all subscribers). The number of countries included in the averages may vary each year.

²⁰ Average MTR per country is obtained by weighting the average MTR of each operator by its market share, measured in terms of subscribers. The number of countries included in the averages may vary each year.

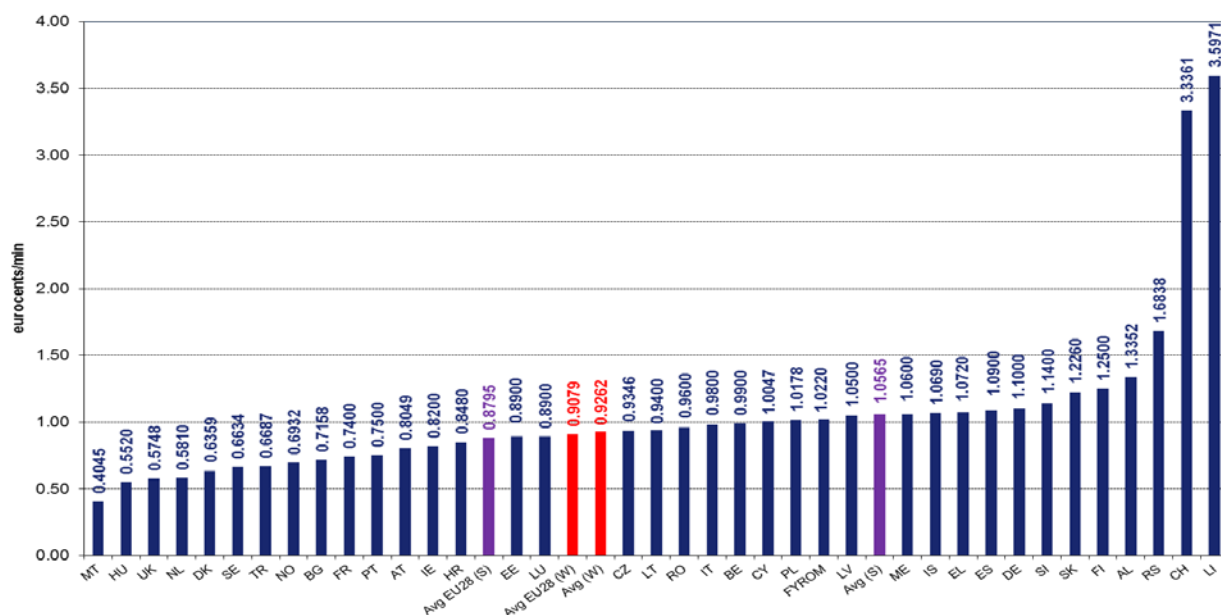


Figure 21: MTR by country, July 2017.

Source: BEREC, Termination rates at European level July 2017.

2.8. Fixed termination rates

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. In the past year, however, 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 regulated²¹ FTRs per country is provided in Figure 22. Data refer to 1 July 2017 and include simple averages at European level as well as a simple average of EU-28 incumbents. The simple average of the lowest regulated FTR of incumbents at European level (all 37 countries) stood at 0.36 cents per minute. The

²¹ Interconnection services in fixed networks are provided at different levels in the hierarchy of the incumbents' networks, called layers. Even though some peculiarities in specific countries are present, in general three main layers for interconnection are defined: (i) layer 1, or local level service provision (layer 1 is defined as the closest possible interconnection level to the network termination point), (ii) layer 2, or regional level service provision (single transit) and (iii) layer 3, national level service provision (or double transit). Due to the increasing symmetry and 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.

simple average of the lowest FTR of European Union incumbents (EU-28) stood at 0.22 cents per minute.

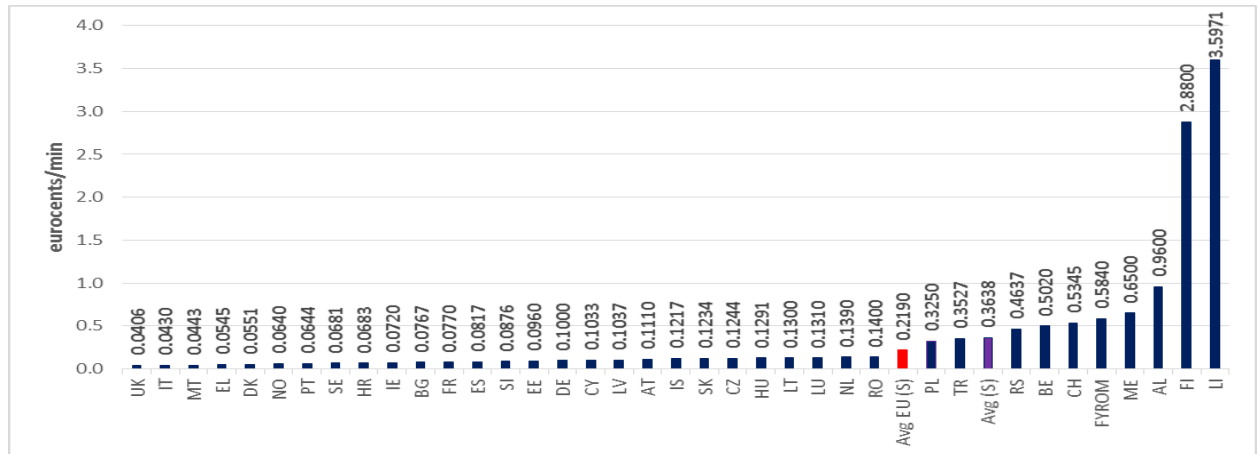


Figure 22: Overview of incumbents' lowest regulated FTRs per country, July 2017 (cents per minute of service).

Source: BEREC, Termination rates at European level July 2017.

2.9. SMS 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 on 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).

The averages of wholesale SMS TRs decreased from January 2016 to July 2017, from 2.57 to 2.41 cents per minute in terms of the simple average, and from 2.25 to 2.04 cents per minute in terms of the weighted average.

Individual Member States' average rates (cents per message) together with simple and weighted averages as at 1 July 2017 are shown in Figure 23²².

²² B&K means that 'bill and keep' agreements are in place for traffic between all domestic operators: termination rates are reciprocally set to zero.

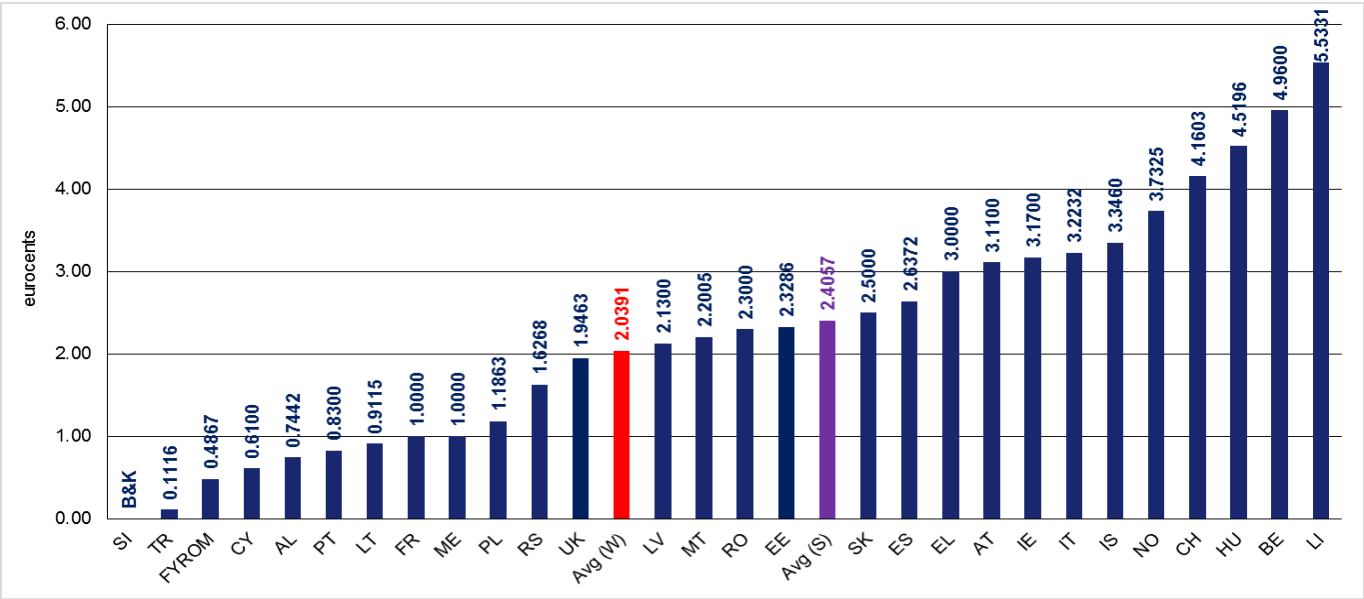


Figure 23: SMS TRs by country, July 2017
Source: BEREC, Termination rates at European level July 2017.

2.10. Regulatory accounting

The overall picture with regard to cost accounting methodologies (Chapter 3 of this report) is relatively stable in comparison with 2016, with just a small number of changes by NRAs having taken place. There are clear preferences for price control methods (generally cost orientation alone or in combination with price caps, but the overall picture is becoming more differentiated), cost base (current cost accounting) and allocation methodologies (mainly long-run (average) incremental costs (LR(A)IC), with fully distributed costs (FDC) preferred in only a few markets). The degree of consistency of application of methodologies continues to be high, while the use of single parameters reflects national circumstances.

The 2017 *Regulatory accounting annual report* provides an analysis oriented to single products (increasing the scope of monitoring). The report collects information on 19 main products (it reported on 13 in 2015).

Cost orientation remains the most commonly used price control method and it is applied mainly to legacy products, while the retail minus category, when chosen, is applied mainly to virtual unbundled local access (VULA) products or in market 3b.

The economic replicability test price control methodology, in line with Commission Recommendation 2013/466/EU, when chosen, is mainly applied to VULA and NGA products.

The most frequently used cost allocation approach is LRIC/LRAIC, for almost all products/markets. LRIC is the preferred approach specifically in termination markets. In access markets (market 3a) there is a preference for LRIC/LRAIC, whereas for duct access FDC is the preferred approach in market 4 and wholesale line rental. In market 3b, both methods are pretty uniformly used for legacy products. When

LRAIC/LRIC is chosen as the main category, the most common approach is bottom up.

With reference to the asset base used in market 3a, a top-down/accounting approach is still preferred to a bottom-up model.

The price control methodology chosen for Unbundled Local Loop (ULL), Subloop Unbundling (SLU) and FULL seems to be related to the competitive situation in the broadband market. Data show greater price flexibility on the part of significant market power (SMP) operators where there is stronger competition with Other Authorised Operators (OAOs).

This is not observed in the case of access to ducts, where cost orientation is the most frequently used approach seemingly regardless of the competitive environment.

In retail markets, the accounting cost base (top-down/accounting methods) is used as the main tool to apply price control obligations, in the few cases where NRAs still regulate market 1/2007. A top-down asset base on the part of the SMP operator seems to be more usual in market 2_2007.

In termination markets, in line with Commission Recommendation 2009/396/EC, a bottom-up approach is more frequently used, regardless of the kind of price control in place.

An analysis of the main motivations behind the choice of costing methodology showed that strict cost orientation is the instrument of choice by which NRAs promote competition, stimulate investments and increase consumer benefit.

The analysis of the structural data (Chapter 4 of this report) confirms that countries start from very different points in terms of population, topography, market situation, etc. These factors play a role in influencing the regulation strategy of NRAs for the wholesale access markets.

Regarding the weighted average cost of capital (WACC), the in-depth survey and the update (Chapter 5 of this report) show that NRAs use the capital-asset pricing model (CAP-M)²³ and hence similar parameters for calculating 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 sources of evidence used. There is no significant difference in the methodology used to estimate the WACC for fixed and mobile markets.

When NRAs calculate the WACC, they may take into account general regulatory principles²⁴ such as predictability, transparency and consistency, sending efficient price and investment signals.

Overall, the 2017 data confirm a consistent approach to regulatory accounting methods. This indicates that NRAs are providing a predictable regulatory environment in their countries. The convergence of regulatory accounting methods is more pronounced for the termination markets, whereas we see a more differentiated picture

²³ Cf. BoR (13) 110.

²⁴ Directive 2009/140/EU.

for the wholesale access markets, reflecting the different national market situations and structural factors influencing regulatory strategy.

3 Framework review

The regulatory developments in the electronic communications sector should be considered in the context of the economic trends outlined above. At the end of 2016, the European Commission had already embarked on a project to update the relevant pieces of EU legislation to adapt them to newly emerged market dynamics and actors, as well as to the policy objectives set in response.

The Commission's legislative proposals referred to as the 'connectivity package', released in September 2016²⁵, aim to take stock of new players active in the markets and to further foster investment in ultra-broadband infrastructure by introducing, under certain circumstances, a more favourable regulatory treatment for brand-new, highly innovative network elements.

During 2017, the co-legislators made significant progress in the analysis of the Commission's legislative proposals: over October, the European Parliament's lead committee, ITRE, adopted its first reading report, while, in the context of intensive work by the Council Working Party, the COREPER approved a first mandate to the Presidency to start interinstitutional negotiations on the dossier relating to the draft European Electronic Communications Code. Trilogues involving the Commission and the co-legislators then took place over October and December, with a view to smoothing out diverging views and achieving a positive conclusion to the first reading phase.

BEREC closely followed the development of these proposals throughout the legislative process, developing more in-depth analysis on a number of matters (see Part B, Section 2.2.1)

A separate legislative process was launched in January 2017 for the adoption of a regulation on privacy and electronic communications, with the goal of updating the relevant directive²⁶, now being treated as a piece of law outside the electronic communications regulatory framework. The initiative follows the adoption of the General Data Protection Regulation (Regulation (EU) 2016/679).

²⁵The package includes a Directive bearing the European Electronic Communications Code, a Regulation establishing BEREC, a Regulation on the promotion of Internet connectivity in local communities, a Communication on connectivity for a competitive Digital Single Market – Towards a European 'Gigabit Society', and a Communication bearing an Action Plan for 5G.

²⁶ Directive 2002/58/EC.

4 Openness of the internet

Safeguarding an open internet throughout Europe has been a primary objective for BEREC in 2017. Following the adoption of the guidelines on the implementation of Net neutrality rules in 2016, BEREC has been actively working in 2017 on providing further assistance to the NRAs in achieving a consistent implementation of the Open Internet Regulation and the related BEREC guidelines while also exploring new issues that might affect the open internet principles.

4.1. Strengthening and ensuring the consistent implementation of net neutrality throughout Europe

In 2017, BEREC published its *Report on the implementation of Regulation (EU) 2015/2120 and BEREC Net Neutrality Guidelines*. This report found that NRAs' practices relating to the core principles of net neutrality, such as bans on the blocking of applications and on discriminatory treatment of specific traffic, were consistent. The report also pointed out that the 2015 Regulation neither allows nor prohibits certain commercial practices per se. The zero-rating cases mentioned in this report thus illustrate that it is key to analyse the specific details of the practice concerned and its circumstances. To this end, the BEREC Net Neutrality Guidelines set out a number of criteria against which zero rating needs to be assessed.

The report also emphasises that BEREC facilitated the exchange of information and knowledge both at the level of the Net Neutrality Expert Working Group and in plenary meetings during 2017 and will continue this work in 2018, to ensure the consistent application of the Regulation.

BEREC concludes that the Regulation has been implemented by NRAs with adequate consistency and that the Net Neutrality Guidelines are well suited to assisting NRAs in performing their tasks of supervision and enforcement as set out in Article 5 of the Regulation. NRAs are in the process of gathering experiences with the first cases, and still need to gather further experiences to be able to evaluate the Net Neutrality Guidelines. At the same time, no cases have appeared in which the Net Neutrality Guidelines themselves were insufficient.

BEREC notes that the evaluation of Regulation (EU) 2015/2120 by the Commission will be conducted by 30 April 2019. Therefore, in late 2018 BEREC will provide the Commission with an evaluation report on its experiences with the application of the Regulation and the Guidelines.

To further support NRAs in their implementation work, other reports have been published gathering information on methodologies and existing supervision tools to detect infringement of net neutrality rules. It was also decided at the end of 2017 to develop a tool within BEREC to detect net neutrality breaches, for the benefit of NRAs and end-users.

This ambitious work on safeguarding net neutrality has been strengthened through BEREC's relations with regulators in non-EU countries. The year 2017 was thus marked by the development of bilateral relations with TRAI, India's regulator, with an emphasis on net neutrality. Exchanges between experts from BEREC and TRAI took

place on this subject in 2017 and the adoption of an association agreement between the two institutions should be ratified in the first half of 2018. A summit was also held in June 2017 between BEREC and the networks of regulators from Central and South America (Regutel), the countries of the Euro-Mediterranean Partnership (EMERG) and the countries of Eastern Europe outside the EU (EaPeReg), and reaffirmed the commitment of all network regulators to safeguarding net neutrality and developing very high-speed connectivity.

4.2. Devices and open internet

Taking a prospective approach to the subject of the openness of the internet, BEREC published its *Report on the impact of premium content on ECS markets and the effect of devices on the open use of the Internet*. The objective of the report was to analyse whether devices may challenge the general objective of an open internet in terms of how end-users can practically use the internet on their devices. Devices and their embedded operating systems (OS) provide the interface for consumers to use the internet; as such, the choice of internet content and applications actually available to consumers may differ depending on the device they use.

In the report, BEREC noted that the vast majority of the limitations observed today relate to unavoidable technical constraints and seem to be accepted by end-users and to fit with their expected usage of devices. However, with the rising popularity of the app format, traditional web-browsers are no longer the main way through which end-users access content on the internet. As such, the freedom for device manufacturers to pre-install the apps of their choice is already a subject of attention for the European Commission. In this context, app stores act as gate-keepers regarding applications, and subsequently regarding much of the content to which end-users can have access on the internet. Currently, however, the potential threats to the openness of the internet that are associated with those situations remain rather hypothetical. To verify that internet use remains open, BEREC considers that monitoring of device markets and software platforms (OS and app stores) by regulatory authorities (competition authorities or sector-specific agencies) might be useful. In general, as technology rapidly evolves in this field, light-touch options based on the publication of collected or crowdsourced data could be an appropriate possibility to explore, empowering consumers by helping them make informed choices, limiting administrative costs for all actors (which is especially relevant for smaller players and new entrants) and impacting every player proportionally to its size.

5 International roaming developments

Since 15 June 2017, roaming charges in the EU and the EEA have been history. With the entry into force of the Roaming Regulation (Regulation (EU) No 2015/2120, published in the Official Journal of 26 November 2015, and including amendments to Roaming Regulation No 531/2012), consumers in the EU can now use their mobile phones within the EU as at home, without any additional surcharge ('Roam Like at

Home' – RLAH). Only in exceptional cases may the operator levy a surcharge for roaming in the EU.

Customers can use voice and SMS services fully as at home; regarding data roaming, service operators can set usage limits for certain tariffs. These usage limits are also known as fair use policies (FUPs). Customers are entitled to a certain minimum amount of data; the exact amount depends on the monthly charges customers pay. The exact limit can be calculated using the following formula:

Net retail charge of mobile services (excl. VAT) ÷ wholesale charge × 2

The wholesale charge is the maximum price that a visited operator is allowed to charge to operators from other countries within EEA. The maximum charge is determined in the Roaming Regulation (Regulation (EU) No 2017/920, published in the Official Journal of 9 June 2017, includes amendments to Roaming Regulation No 531/2012). It amounted to EUR 7.7 per GB from 15 June 2017 to 31 December 2017 and has been at EUR 6.0 from 1 January 2018. According to the Roaming Regulation, this charge will be gradually reduced at the beginning of each year until the expiry of the Roaming Regulation in 2022. The following table gives an overview of the maximum charges.

Date	Wholesale charge per GB excl. VAT.
from 15 June 2017	7.7 €
1 January 2018	6.0 €
1 January 2019	4.5 €
1 January 2020	3.5 €
1 January 2021	3.0 €
1 January 2022	2.5 €

Besides the limit on data, operators can implement a control mechanism to check that customers, within a period of four months, do not have prevailing roaming usage and presence. An additional safeguard for operators, is the stable link proof; operators can ask customers to provide evidence that they have a stable link in the country of the domestic operator, to avoid permanent roaming scenarios.

If the customer exceeds the limit or does not comply with the control mechanisms or the stable link criterion, the provider may levy surcharges in addition to the domestic price. The surcharge is capped at the level of the regulation wholesale prices. For data services, wholesale caps are listed above, and outgoing calls and SMS services are capped at 3.2 cents per minute and 1 cent per SMS.

In order to assess the competitive developments and the impact of RLAH in the Union-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 not subject to the maximum wholesale roaming charges and on the implementation of

contractual measures at wholesale level aiming 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 is to assess how closely those elements relate to each other.

The following paragraphs provide the results of these exercises and show the developments on volumes and revenues for both the retail and wholesale markets. The figures for the first time include the impact of RLAH.

RLAH led to significant increases in traffic. Data traffic growth increased by 148.43% in Q3 2017 and by 134.09% in Q2 2017 with respect to the previous quarter. In Q1 2017, the increase with respect to the previous quarter was 13.52%, –19.03% in Q4 2016 and 123.13% in Q3 2016. Over the same period, the growth in traffic for outgoing international calls also rose by 78.34% in Q3 2017, compared with 33.17% in Q2 2017; 2.88% in Q1 2017; 0.26% in Q4 2016 and 35.81% in Q3 2016.

Quarter to quarter growth of traffic for calls received increased to 44.05% in Q3 2017, compared with 19.15% in Q2 2017, 1.48% in Q1 2017, 0.86% in Q4 2016 and 24.66% in Q3 2016. The growth rates for SMS services are the following: 92.94% in Q3 2017, 32.71% in Q2 2017, –5.15% in Q1 2017, –27.90% in Q4 2016 and 59.02% in Q3 2016. The increase in traffic observed in EEA countries in Q3 2017 is related to the RLAH services introduced just before the summer period. Although international roaming services show high seasonal variation, the results clearly show that the 2015 update of the Roaming Regulation has significantly contributed to the development of the international roaming market.

The introduction of RLAH services, coupled with the growing demand for data services, has changed the international roaming market. The point could be made that RLAH services have enabled a substantial increase in international roaming traffic. The minutes generated under RLAH tariffs account for the majority of the voice traffic. 91.69% of minutes of calls made and 91.69% of minutes of calls received were generated by subscribers to RLAH tariffs. For text messages sent while roaming within EEA countries, RLAH tariffs accounted for 94.53% of the total volume in Q3 2017. In Q3 2017 around 90.05% of data traffic was based on the RLAH data tariff while roaming.

Increased volumes can be seen in the relationship between Q3 2016 and Q3 2017. The average EEA subscriber spent 14.34 minutes per month on calls in Q3 2017, in comparison with 8.8 minutes in Q3 2016. The number of received call minutes abroad amounted to 11.08 minutes per EEA average roaming subscriber per month in Q3 2017, whereas this was around 9.5 minutes in Q3 2016. Data traffic increased by 434.55% from Q3 2016 to Q3 2017. Data roaming consumption ranged from 59.02 MB

to 1616.13 MB per roaming subscriber monthly in Q3 2017 in comparison with a range from 8 MB to 342 MB in Q3 2016.

BEREC has 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, also non-mobile services. Operators are finding it difficult to organise their revenue data by individual service categories (ISCs), 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 ISCs require bundle revenues to be allocated to their components. Therefore, BEREC examined the alternative of presenting data on the evolution of the ARRPU²⁷. 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 mentioned above, BEREC has calculated the ARRPU; the results should, however, be interpreted with caution. For this calculation, BEREC used the data relating to domestic mobile services submitted by operators. The domestic monthly ARRPU for Q3 2017 varies considerably between the countries, ranging from EUR 2.31 per month to EUR 29.44 per month, with a weighted EEA average of EUR 11.13. Disproportion between individual ARRPU could be caused by different methodologies used by operators to allocate the revenues to different domestic mobile services. In comparison with Q2 2017, the ARRPU in Q3 2017 remained 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 2017		Q3 2017 ²⁸	
	Price Cap	EEA Average	Price Cap	EEA Average
Wholesale voice (€/minute)	5	2.52	3.2	2.41
Wholesale SMS (€/SMS)	2	0.68	1	0.55
Wholesale data (€/MB ²⁹)	5	0.57	0.77	0.40

The decline was especially significant for wholesale roaming data services. The EEA average price for wholesale data services fell to 0.57 cents per MB in Q2 2017 and 0.40 cents per MB in Q3 2017, compared with 1.02 cents and 0.99 cents in Q2 2016 and Q3 2016 respectively. In the context of wholesale inbound roaming costs, the EEA average price for handling balanced traffic was 0.65 cents per MB in Q2 2017 and 0.47 cents per MB in Q3 2017, whereas the EEA average price for handling

²⁷ ARRPU: Average Retail mobile Revenue Per User.

²⁸ With effect from 15 June 2017

²⁹ 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.

unbalanced traffic was 0.45 cents per MB in Q2 2017 and 0.34 cents per MB in Q3 2017.

The figures below are extracted from the *International roaming BEREC benchmark data report April-September 2017*:

Figure 11
RLAH - Data services
(millions of GB)
Q2 and Q3 2017

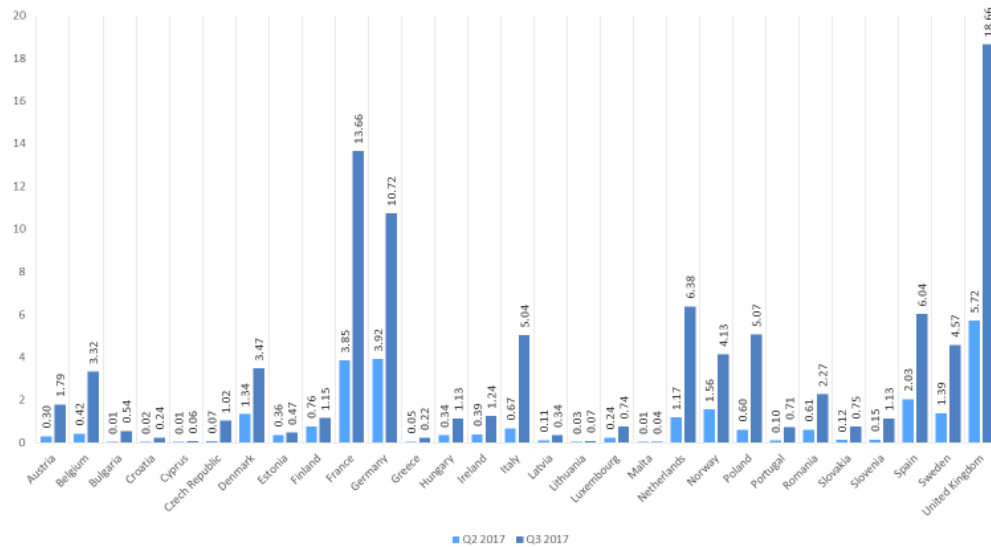
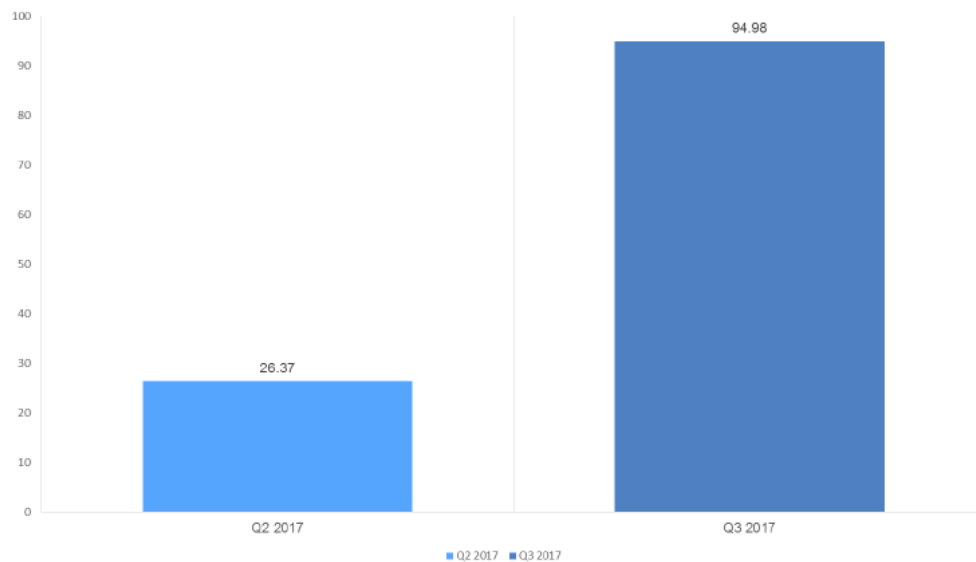


Figure 12: EEA Total traffic - RLAH
Data services (millions of GB)
Q2 and Q3 2017



EEA average excludes Iceland

DOR (10) 51

Figure 63: EEA percentage of data roaming services: RLAH, RLAH+ (non-compliance with/exceeding FUP), RLAH+ (derogation), alternative tariff (in Gb)

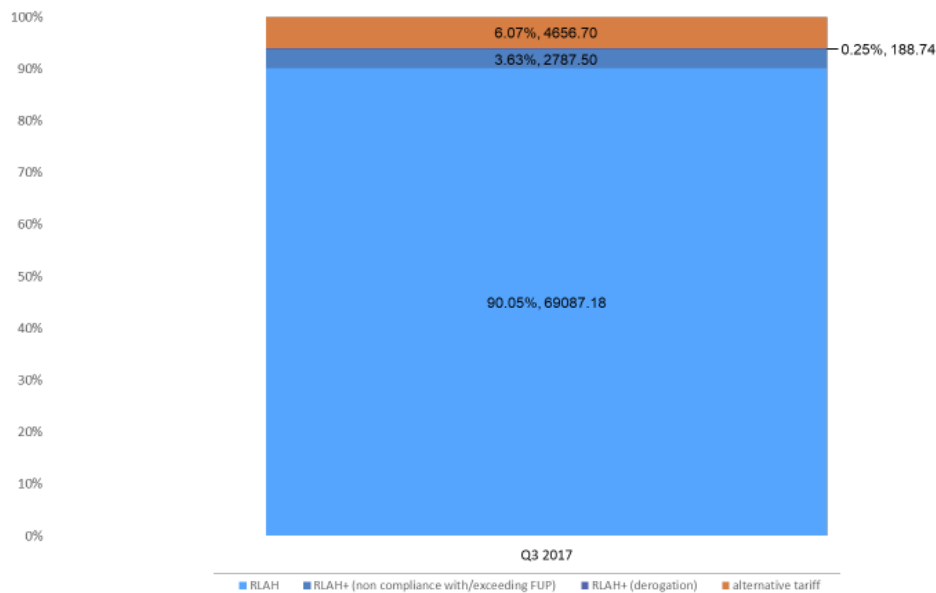
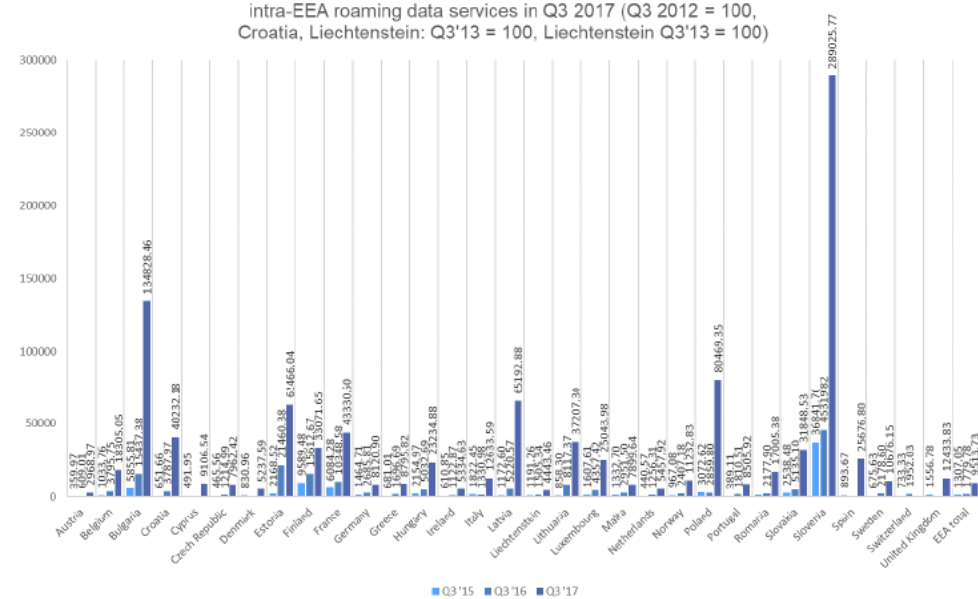
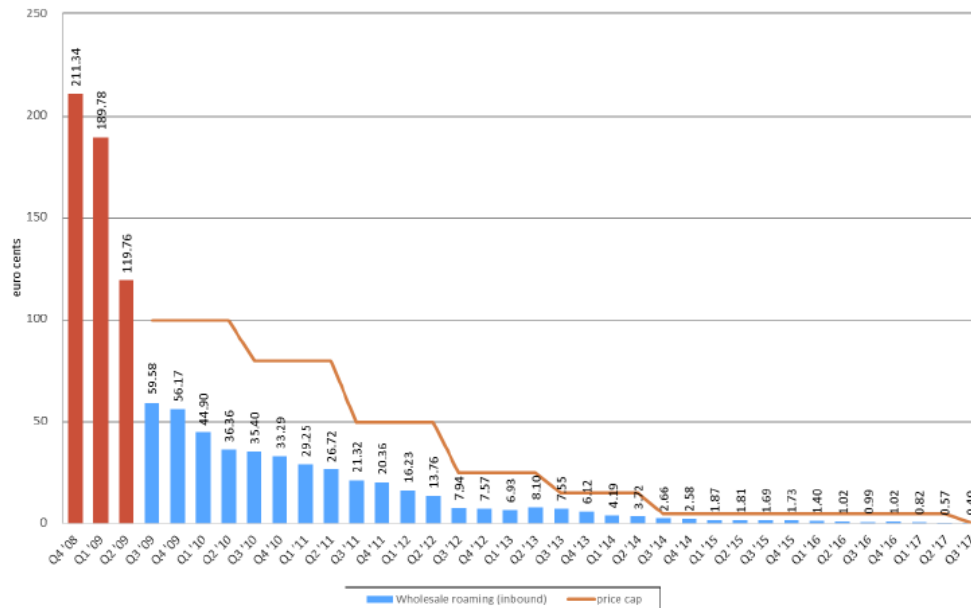


Figure 66: Retail Data traffic Index, intra-EEA roaming data services in Q3 2017 (Q3 2012 = 100, Croatia, Liechtenstein: Q3'13 = 100, Liechtenstein Q3'13 = 100)



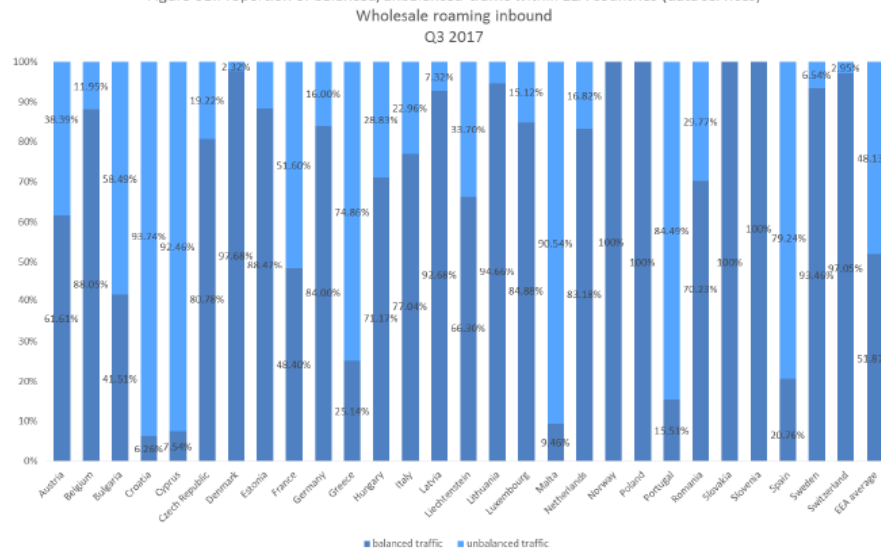
EEA average excludes Iceland

Figure 57: EEA average: average wholesale data price per Mb (prepaid+postpaid)



EEA average (Q2 2017 and Q3 2017) excludes Iceland

Figure 61: Proportion of balanced/unbalanced traffic within EEA countries (data services)



While the measurement of balanced/unbalanced traffic should include volumes and revenues from all operators per country, such information is currently only available for a limited number of NRAs. For some countries, even if a data set is available, not all operators are included. Please also read carefully the chapter on the methodology for the data collection on page 100.

Portugal: estimates are based on partial information provided by two operators

EEA average excludes Finland, Iceland, Ireland, UK

Conclusion

The year 2017 was another busy one for BEREC, which, under an ambitious work programme, focusing on the review of the European regulatory framework for electronic communications, as well as open internet and connectivity issues, approved several important pieces of work in response to market developments.

Addressing the review of the regulatory framework for electronic communications, BEREC published several papers that aimed to provide expertise to the European institutions during the legislative process.

Safeguarding an open internet in Europe remained one of BEREC's top priorities, and it supported the consistent implementation of the Open Internet Regulation and the related guidelines by NRAs. In addition to this, BEREC decided to develop an opt-in measurement tool to measure the quality of fixed or mobile internet access services and detect potential illegal traffic management practices.

BEREC addressed various other topics, including the review of SMP guidelines, the roaming regulation, IP interconnection practices and the impact of content markets and devices on fixed and mobile ECS markets.

Enhancing connectivity in Europe was another top priority for BEREC in 2017, and this is expected to continue in the coming years. In this regard, BEREC addressed issues related to mobile connectivity for the first time and, following a public consultation, issued a joint report with the RSPG.

BEREC reviewed its strategy for 2018-2020, identifying five strategic priorities that defined BEREC's 2018 work programme. The priorities were set taking into account the latest market developments, and in particular the beginning deployment of 5G in Europe.

PART B: Annual Report on BEREC activities in 2017 – under Article 5(5) of Regulation (EC) No 1211/2009 of the European Parliament and of the Council of 25 November 2009 establishing the Body of European Regulators for Electronic Communications (BEREC) and the Office

1 Introduction

The aim of this report is to briefly present the activities of the Body of European Regulators for Electronic Communications (BEREC) in 2017, in accordance with Article 5(5) of Regulation (EC) No 1211/2009 of the European Parliament and of the Council of 25 November 2009 (the BEREC Regulation).

As usual, the annual report on BEREC's activities in 2017 is based on the work streams and priorities that were laid out in the BEREC Work Programme 2017 and updated throughout the year. This report mainly covers the work carried out by the Expert Working Groups (EWGs) and ad hoc teams.

Each section of this report contains a description of the work undertaken in 2017 and a list of the documents produced within each work stream. Article 7/7a cases are presented in a similar manner.

2 Work Programme 2017

2.1 Promoting competition and investment

2.1.1 The impact of content and devices on fixed and mobile electronic communications sector markets

The general purpose of this report is to provide a snapshot of how the electronic communications sector (ECS) is influenced by other sectors, in particular by content and devices, and to provide some thoughts on the potential implications of this influence.

The report demonstrates that, in most countries, bundling is used by ECS providers to commercialise premium content, and this trend appears to be on the rise globally. A mixed picture emerges regarding the impact of these practices on competition dynamics in ECS markets, with both negative and positive effects. Whether or not the bundling of premium content with ECS affects competition in the ECS market may depend on the ability of all actors to compete effectively with the bundled offers of large ECS providers.

The second subject being analysed in this report is whether or not devices challenge the general objective of an open internet in terms of how end-users can practically use internet services on their devices. Devices and their embedded Operating Systems provide the interface for consumers to use the internet; as such, the choice of internet content and applications actually available to consumers may differ depending on the

device they use. BEREC is of the opinion that the monitoring of device markets and software platforms (Operating System and application stores) by regulatory authorities (i.e. competition authorities or sector-specific agencies) might be useful in verifying that internet use remains open.

This draft report was subject to a public consultation between 11 October and 8 November, and the final report was approved in early 2018.

Document:

BoR (17) 181 – BEREC Report on the impact of premium content on ECS markets and the effect of devices on the open use of the internet

2.1.2 Convergence of fixed and mobile networks

The report on the convergence of fixed and mobile networks aims to analyse operators' needs in terms of backhaul services and to provide an up-to-date picture of the regulation by national regulatory authorities (NRAs) of the provision of mobile backhaul services. In fact, while fixed–mobile convergence is a far-reaching phenomenon that encompasses many technological, market and regulatory issues, the report focuses specifically on the infrastructure level and, in particular, on mobile backhaul.

The report examines the extent to which the regulation of fixed services is being adapted or modified to take competition issues related to mobile backhaul into account; it also examines how regulation might change in the near future, with the aim of guaranteeing competition in an environment characterised by growing demand for infrastructures.

The report, which draws upon the results of two surveys (one among mobile network operators (MNOs) and one among NRAs), finds that, in response to increasing speed and availability requirements by some users, MNOs are in the process of switching from legacy solutions to higher capacity fibre-based backhaul solutions. The data collected confirm that wireless technologies are still the predominant technology for mobile backhaul, but the data also show a tendency towards fixed technologies (in particular fibre links). Most operators, in fact, believe that fibre links will be increasingly necessary to meet the requirements of future mobile services in terms of latency and throughput. However, some respondents highlighted that it is not yet clear what those requirements will be.

Backhauling solutions implemented by MNOs are a mix of own and leased infrastructures. Convergent operators, which emerged from the incumbent, typically show very high proportions of self-owned infrastructure. However, MNOs' reliance on third-party infrastructure is generally relatively low in comparison with self-owned infrastructure. A key factor in this seems to be MNOs' growing need to control the technical conditions of mobile backhaul.

From the point of view of regulatory policies, the report finds that, in most countries, NRAs adopt regulatory solutions for fixed services that can also be used by mobile operators for mobile backhaul. In other countries, obligations are imposed on fixed markets requiring them to not have an impact on mobile backhaul. This does not necessarily mean that NRAs have not taken into account issues of fixed–mobile

convergence, as, in a number of cases, other regulatory (or legislative) measures, such as symmetric obligations, are in place to ensure access to fixed infrastructures for mobile backhauling. In other cases, the market for such infrastructures is considered sufficiently competitive. All NRAs closely monitor the development of the market and the mobile backhaul needs of operators.

Document:

BoR (17) 187 – BEREC Report on the convergence of fixed and mobile networks

2.1.3 New forms of sharing passive optical networks based on wavelength division multiplexing

In October 2017, BEREC published the report 'New forms of sharing passive optical networks (PONs) based on wavelength division multiplexing' in response to a new PON standard (NG-PON2) that was approved at the end of 2014. This PON standard enables several network operators to use the same PON fibre infrastructure and to operate their own wavelength on top of it, namely wavelength unbundling (WU). The aim of this report was to gain a greater insight into this new form of sharing PON based on wavelength division multiplexing, as well as to foster knowledge transfer between NRAs, with the following objectives:

- to provide an overview of the current and expected future deployment of NG-PON2 based on information from 50 European network operators and three major vendors;
- to determine if WU has been imposed in any of the 14 EU countries in which NRAs have taken a decision on market 3a since the standardisation of NG-PON2;
- to discuss aspects that may be useful for a NRA to take into account when considering whether or not to impose WU on the significant market power (SMP) operator; and
- to explore if WU based on NG-PON2 might increase network operators' interest in co-investing in PON, again based on information from 50 European network operators.

To date, NG-PON2 has not yet been deployed in the networks of any of the 50 European network operators considered in the report. However, 25 of them (50%) thought that it was likely that they would deploy NG-PON2 in their fibre-to-the-home (FTTH) networks. According to the three major vendors that replied to the questionnaire, mass deployments of NG-PON2 (time and wavelength division multiplexed PON) are expected to begin around 2019/2020.

In 14 of the 31 European countries considered, the NRA had taken a regulatory decision on the wholesale local access market (market 3a) since the standardisation of NG-PON2 at the end of 2014 and, in eight of them, the SMP operator had a FTTH network based on PON. In seven of these countries, WU was not imposed on the SMP operator. In one country (Germany), a general unbundling obligation (which also included WU) was imposed on the SMP operator, but WU is currently not used.

The report also highlights several aspects that may be useful for a NRA to take into account when it considers whether or not it is appropriate to impose WU on the SMP

operator. The report also shows that NG-PON2 increased the interest of 10 (25%) of the 40 operators in co-investing in FTTH networks based on PON.

From an overall perspective, it can be concluded that NG-PON2 technology, although currently still in a state of laboratory testing and field trials, is likely to be deployed in the networks of several SMP operators in the coming years. For NRAs considering whether or not to impose WU on the SMP operator, it may be useful to take the aspects discussed in this report into account. WU, in principle, has advantages over a layer 2 wholesale access product (e.g. virtual unbundled local access (VULA)); however, the use of WU as an access remedy currently also faces significant obstacles.

Document:

BoR (17) 182 – BEREC Report on the new forms of sharing passive optical networks based on wavelength division multiplexing

2.1.4 Implementation of the Broadband Cost Reduction Directive

In December 2017, BEREC published the report ‘Implementation of the Broadband Cost Reduction Directive (BCRD)’ in response to the publication of this directive in 2014. The BCRD aims to facilitate and incentivise the roll-out of high-speed electronic communications networks by promoting the shared use of existing physical infrastructure and by enabling more efficient deployment of new physical infrastructure. In particular, it defines tasks for a dispute settlement body (DSB) and a single information point (SIP). Member States were required to adopt and publish the laws, regulations and administrative provisions necessary to comply with the BCRD by 1 January 2016 and to apply those measures from 1 July 2016.

The aim of this report was to gain a greater insight into the implementation of the BCRD and to foster the exchange of experiences between NRAs, with the following objectives:

- to provide an overview of the tasks defined in the BCRD that were appointed to the NRAs and of whether or not the NRAs had already begun their activities on a general level, based on information from all 28 EU countries;
- to provide an overview of the implementation of the tasks appointed to the NRAs, based on the experiences of 16 EU countries with regard to the DSB and seven EU countries with regard to the SIP; and
- to provide a more detailed description of the implementation by NRAs of the DSB in five EU countries and of the SIP in six EU countries.

The report shows that the tasks for the DSB were appointed to the NRA in 22 countries and to the NRA and another organisation in one country. As regards the tasks for the SIP, they were appointed to the NRA in 10 countries and to the NRA and another organisation in three countries.

The report analyses the implementation of the DSB by the NRAs in the 16 EU countries considered with regard to:

- general information on the implementation of the DSB;

- information on the disputes resolved so far; and
- the most difficult challenges the NRA was faced with in the dispute settlement procedures.

The examination of the implementation of the SIP by the NRAs in the seven EU countries considered includes:

- the tasks for the SIP defined in the BCRD that were appointed to the NRAs;
- the implementation of each of these tasks by the NRAs; and
- the most difficult challenges the NRAs were faced with in the implementation of the SIP.

Overall, it seems that the electronic communications network operators either reach an agreement in nearly all requests with the infrastructure provider without the need to involve the DSB or have no interest in their rights laid down in the BCRD (or do not know these rights). The BCRD is still in an initial phase and therefore its use by electronic communications network operators may increase in the future.

Document:

BoR (17) 245 – BEREC Report on the implementation of the Broadband Cost Reduction Directive

2.1.5 Access conditions to State aid-funded infrastructure

In December 2017, BEREC published the report 'Analysis of individual NRAs' roles around access conditions to State aid-funded infrastructure'. The EU State Aid Guidelines, which set out the general conditions for State aid for broadband network projects and for the role of NRAs in State aid schemes, have now been in place for almost 5 years. This report examines how access conditions based on the EU State Aid Guidelines have been implemented in different Member States, focusing on the role of the NRAs. It is based on information provided in a questionnaire filled out by 25 Member States. Two of these Member States do not have any State aid projects. In seven Member States, the NRA has no competencies in State aid and therefore, in some cases, only limited information on such projects is available.

Some background is provided in the report on how State aid projects are implemented (individual programmes, umbrella schemes, etc.) and what kind of investment models are used (e.g. an operator subsidy or gap funding model, a publicly or privately run municipal network model) in Member States. The report shows that, with regard to implementation, the countries can essentially be split into two groups:

- Countries with a large number of State aid projects under umbrella schemes or the General Block Exemption Regulation that are usually implemented at the regional or local level.

In these countries, NRAs or other competent bodies have typically issued guidelines on wholesale access conditions and pricing methods to increase

transparency for the operators and to ease the administrative burden of both the regional/local competent authorities and the NRAs.

- Countries with a limited number of integrated projects that encompass a large area or number of communities/districts.

In these countries, it is generally unnecessary to issue guidelines, as laid down in the State Aid Guidelines, because all of the access conditions and pricing methods that the subsidised operator has to comply with for a specific project are included in the tender/project in advance. In many of these cases, the competent body at the national level is a central organisation/authority and NRAs are typically involved in the preparation and/or implementation of these projects, for example taking the role of an advisory body to the competent body at the national level.

It generally has turned out that access products and prices used for State aid cases are often the same or very similar to the reference offers or the regulated products of the SMP operator. However, the stage at which NRAs are involved and how, as well as the methods of implementation, vary between countries.

Document:

BoR (17) 246 – Analysis of individual NRAs' roles around access conditions to State aid-funded infrastructure

2.1.6 Facilitating mobile connectivity in 'challenge areas'

This BEREC and Radio Spectrum Policy Group (RSPG) joint report provides a comprehensive and comparative assessment of initiatives to facilitate mobile connectivity in 'challenge areas', namely where mobile connectivity is limited or non-existent. It focuses in particular on the regulatory and legal measures that have been adopted to resolve this issue (radio access network sharing, passive/active sharing, etc.).

The report describes four categories of challenge areas: indoor, transportation means, non-profitable areas and other areas (i.e. protected areas, 'grey' areas and areas of low-quality service). For each type of challenge area, the report describes the difficulties encountered and focuses on the solutions and observed practices that have been implemented in EU Member States to tackle the obstacles standing in the way of mobile connectivity. Among other topics, this report addresses digital planning obligations or public/private initiatives, white area coverage, rural area coverage, constrained areas, indoor connectivity and transportation means.

For each challenge area, the report not only focuses on the technical solutions implemented or considered by EU Member States, but also analyses the regulatory or legal measures that have been adopted. Forward-looking solutions are also examined in the report in the light of what is taking place in different markets.

Overall, the report recognises that the solutions described can have limitations and possibly undesired consequences, and it describes some of these limitations. However, the report proposes a non-exhaustive list of possible solutions that NRAs and other competent authorities could consider to enhance the coverage and performance of European mobile networks.

Document:

BoR (17) 256 – BEREC and RSPG joint report on facilitating mobile coverage in 'challenge areas'

2.1.7 Internet protocol interconnection practices in the context of net neutrality

In 2012, BEREC published a report assessing internet protocol (IP) interconnection in the context of net neutrality. This report has been updated, with the updated report adopted in 2017. This updated report puts the original findings to the test, considering the developments since 2012 and using insights from the third expert workshop on IP interconnection in cooperation with the Organisation for Economic Co-operation and Development (OECD) held in November 2016.

The report shows that many of the developments that were observed in 2012 – such as increasing internet traffic volumes mainly driven by video-streaming services, declining prices for transit and content delivery network (CDN) services and the continuous decline of the costs of delivering data packets on a per unit basis – are still ongoing.

This report also provides a general outline of IP interconnection disputes in recent years. Traffic asymmetries are a major factor where disputes emerged in practice. Often, these disputes are characterised by mutual recriminations between the parties involved.

Furthermore, in this report, BEREC sets out the challenges of identifying the exact location of congestion and the party responsible for this. While congested internet links may exist in practice, this does not seem to be a general phenomenon.

Country case studies outline how different European NRAs and/or national competent authorities have engaged in IP interconnection issues since 2012. This includes France, the Netherlands, Spain and Switzerland, as well as the European Commission and the USA.

Based on the evidence provided in this report, BEREC draws the following conclusions:

- While aggregate internet traffic volumes continue to grow, prices for transit and CDN services also continue to decline. BEREC considers that the internet ecosystem is still able to cope with increasing traffic volumes.
- Where disputes have emerged in practice, these seem to involve complex relationships and economic/strategic considerations of the providers.

- Disputes were typically resolved in the market without regulatory intervention. However, NRAs should carefully monitor whether or not this continues to be the case.
- The availability of transit and its substitutability with peering is one of several factors relevant for the assessment of a competitive bottleneck.
- While transit is declining as a proportion of traffic, it remains a very significant form of interconnection. Therefore, the availability and pricing of transit might be expected to constrain negotiations over the settlement basis of peering agreements. However, transit's ability to substitute for peering may be less clear in the case of video streaming, where demand for capacity is very large and high quality is required.
- Other relevant factors include retail competition and switching, as well as content and application providers', CDNs' and transit providers' countervailing powers in negotiations with internet access service (IAS) providers. However, these factors are predicated on conditions that may not always hold (the availability of alternative transit routes, ease of consumer switching, etc.). Broadly, NRAs have to date found that factors such as the above do mitigate potential concerns. It should be noted, however, that NRAs' conclusions apply mainly to their national markets and caution should be exercised when considering wider implications. If a complaint is addressed to the NRA, it has to be carefully assessed based on the specifics of the individual case.
- NRAs should consider monitoring developments. If they have the appropriate powers, NRAs may wish to collect data on interconnection markets, for example covering the role of transit and peering and the extent of paid peering, thereby enhancing transparency.
- Competition and transparency for consumers remain key factors for ensuring that market forces work efficiently.
- NRAs should continue to apply a careful approach when considering whether or not regulation is actually warranted.

Document:

BoR (17) 184 – BEREC Report on IP interconnection practices in the context of net neutrality

2.1.8 Monitoring of mobile network coverage

Each NRA uses different means to provide information on national mobile coverage, but this is a significant obstacle to having a consistent approach in terms of both public policy and users' information. Developing a common understanding of how mobile coverage is measured and published is the first step in alleviating this obstacle.

The report identifies how mobile coverage is measured and published by some European NRAs. It describes the main characteristics that are essential for providing mobile coverage information to consumers, policy makers and industry. More specifically, the report:

- defines a common vocabulary for mobile coverage;

- describes the main characteristics of measuring and reporting mobile coverage and some of the key standards used in this area;
- highlights the main mobile services that are monitored by NRAs;
- describes some of the key features of maps used by NRAs to report mobile coverage.

The document identifies five characteristics of mobile coverage: service (SMS/MMS, voice, specialised services and IASs), user location (indoor, outdoor and in transport), user equipment (handset performance), performance indicators (signal levels, quality of service and quality of experience) and service time availability.

The report then describes two methods for providing information on mobile coverage. The first takes the form of macro information through metrics (usually a percentage of the population or territory in a given geographical area). This information is difficult to compare without the underlying characteristics of the metrics. The second method uses information on specific locations using maps. The report discusses, using examples, some characteristics of these maps with regard to accuracy (number of layers displayed, granularity) and transparency (technology and/or service displayed, legends, accessibility of the map).

This report is a first step towards a BEREC Common Position on monitoring mobile coverage. Further internal work will be undertaken to prepare the Common Position to be submitted for a second public consultation in the first quarter of 2018.

Document:

BoR (17) 186 – BEREC Preliminary report in view of a Common Position on monitoring mobile coverage

2.2 Promoting the internal market

2.2.1 Framework review

After having carried out an overall assessment of the Commission's review proposals that were released in September 2016, in 2017 BEREC closely followed the development of these proposals throughout the legislative process, developing more in-depth analysis on a number of matters and providing expert views on the critical issues identified.

Beginning in March and continuing into June 2017, BEREC adopted a set of 13 technical papers that were aimed at providing expertise to the co-legislators' debate by means of focused technical evaluations on a wide range of specific issues. In these papers, BEREC reasserted its supports to the Commission's connectivity goals directed towards the deployment of VHC networks and 5G. It also highlighted that competition is a key driver for investment and that proportionate regulation and sustainable investment should therefore not be seen as opposed to one another. As a consequence, independent NRAs should remain able to define the most appropriate regulatory treatment of future networks, in particular those subject to co-investment schemes, and any step-back of competition oriented regulation should be grounded

on their market-specific assessment. On spectrum, BEREC recognised that competition in mobile markets is likely to have a substantial impact on the sector as a whole and welcomed the Commission's proposals for the targeted role for NRAs in relation to market-shaping aspects of spectrum management

This comprehensive set of papers – covering, inter alia, subjects relating to market analysis and regulation, investment incentives, spectrum regulation and institutional issues, as addressed in the review proposals – was followed in October 2017 by further BEREC analysis of the universal service and general authorisation discipline proposed for the future electronic communications framework.

With regard to the institutional layout, in addition to its comments on the proposed BEREC Regulation in the papers adopted in March 2017, BEREC also adopted a high-level statement concerning the need for a minimum set of competences for independent NRAs early in October 2017. In this statement, BEREC highlighted the validity of the European Commission's proposal for a common set of competences for EU NRAs, noting that it would allow regulatory exchanges to be pursued more effectively at the EU level and therefore would help in the achievement of the internal market goal.

Documents:

BoR (17) 83 – Promoting investment, protecting competition and preserving the integrity of the SMP framework

BoR (17) 84 – BEREC views on non-competitive oligopolies in the Electronic Communications Code

BoR (17) 85 – BEREC views on the market review process in the Commission's proposal and ITRE draft Report

BoR (17) 86 – Symmetric regulation

BoR (17) 87 – BEREC views on Article 74 of the draft Code 'Co-investment and "very high-capacity (VHC) networks"'

BoR (17) 88 – BEREC views on Article 77 of the draft Code 'Vertically separate undertakings'

BoR (17) 89 – BEREC views on the double lock veto in the Commission's proposal and ITRE draft Report

BoR (17) 90 – BEREC's views on duration, on renewal of rights and on coordinated timing of assignments (Articles 49, 50 and 53)

BoR (17) 91 – BEREC paper on the Commission's proposals for an EECC Spectrum Provisions – Implementing Acts

BoR (17) 129 – Peer review process (Article 35)

BoR (17) 92 – BEREC views on information gathering powers

BoR (17) 93 – BEREC views on Articles 12 and 16 of the draft Codes 'Notification process' and 'Administrative charges'

BoR (17) 94 – BEREC views on the draft report elaborated by ITRE Rapporteur Evžen Tošenovský on the proposal for a regulation of the European Parliament and of the Council establishing the Body of European Regulators for Electronic Communications

BoR (17) 203 – BEREC views on the universal service regime, as in the Commission's proposals and IMCO Opinion

BoR (17) 202 – BEREC views on ITRE proposals introducing a country of establishment principle under the Code

BoR (17) 194 – The need for a minimum set of competences for independent NRAs in the European Electronic Communications Code

2.2.2 Contribution to the review of SMP guidelines

On several occasions, BEREC has acknowledged the importance of the Commission Guidelines on market analysis and the assessment of significant market power (the SMP guidelines) and has considered how they should be modified, especially when important competition issues have occurred that were not covered by the Commission's 2002 guidelines. In particular, BEREC raised the issues of the regulation of tight oligopolies and the updating of the SMP guidelines to address competition concerns in this type of market setting; it also evaluated how NRAs should analyse joint dominance when assessing SMP within the relevant markets.

BEREC has participated in the review process of the SMP guidelines, initiated by the European Commission with the launch of a public consultation in March 2017. BEREC provided its feedback to this public consultation in June 2017. In addition, BEREC has been actively participating in the external study 'Review of the significant market power (SMP) guidelines' (SMART 2016/0015) and, at the request of the European Commission, provided comments and feedback on draft versions prepared by the contractors. Finally, BEREC also provided its feedback on the draft updated SMP guidelines that published by the European Commission in 2018.

Document:

BoR (17) 115 – BEREC response to the public consultation from the EC on the update of the SMP guidelines

BoR (18) 50 – BEREC Opinion on Draft SMP Guidelines

2.2.3 Update of BEREC guidelines on the Roaming Regulation

The Telecommunications Single Market (TSM) Regulation, adopted in 2015, included amendments to the Roaming Regulation (531/2012), resulting in the need for updates to the BEREC Retail Guidelines on the Roaming Regulation published in 2016 (BoR (16) 34), which dealt mainly with the transitional period.

This further update was necessary, as the TSM Regulation and Commission Implementing Regulation (EU) 2016/2286 of 15 December 2016 – which laid down detailed rules on the application of a 'fair-use policy', on the methodology for assessing the sustainability of the abolition of retail roaming surcharges and on the application to be submitted by a roaming provider for the purposes of that assessment – included substantial changes to the roaming regime, introducing 'Roam Like at Home' (RLAH). Indeed, the 2015 TSM Regulation imposed the requirement that, from 15 June 2017 onwards, roaming providers must not levy any additional surcharge to the domestic

retail price on roaming customers in any EEA Member State for any regulated roaming service subject to a fair-use policy.

Furthermore, Regulation (EU) 2017/920 of the European Parliament and of the Council of 17 May 2017 amended Regulation (EU) No 531/2012 regarding the rules for wholesale roaming markets. Therefore, a revision of the BEREC Wholesale Guidelines of 2012 (BoR (12) 107) to include these changes was also necessary. These guidelines concern the wholesale roaming access obligations and conditions for MNOs and the rights for access seekers as laid down in Article 3 of the Roaming Regulation.

Documents:

BoR (17) 56 – BEREC Guidelines on Regulation (EU) No 531/2012 as amended by Regulation (EU) 2015/2120 and Commission Implementing Regulation (EU) 2016/2286 (Retail Roaming Guidelines)

BoR (17) 114 – BEREC Guidelines on Regulation (EU) No 531/2012, amended by Regulation (EU) 2015/2120 and by Regulation (EU) 2017/920 (Wholesale Roaming Guidelines)

2.2.4 Input to the Commission Implementing Act on weighted average mobile termination rates

According to Article 6e(2) of the 2012 Roaming Regulation, 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 5 October 2017.

Document:

BoR (17) 166 – BEREC input to the Commission Implementing Act on weighted average MTRs

2.2.5 Periodic international roaming reports

2.2.5.1 Benchmark 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 volumes 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 18th benchmark report in June 2017 and the 19th benchmark report in October 2017. For the 18th and 19th benchmarking exercises,

significant changes were made to meet the new requirements in the amended Article 19 of the Roaming Regulation.

Documents:

BoR (17) 102 – International Roaming BEREC Benchmark Data Report April-September 2016

BoR (17) 168 – International Roaming BEREC Benchmark Data Report October 2016-March 2017

2.2.5.2 Report on the transparency and comparability of 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 a report produced once a year. The objective of this report is to monitor and increase consumer awareness of the variety of roaming tariffs, and to increase transparent market conditions and the ability for customers to make well-informed decisions. The report addresses key questions on whether or not information on price and tariff conditions is made available in a clear and convenient way and whether or not consumers are able to compare those tariffs. Operators and regulators were asked several questions relating to these two key issues in August 2017. BEREC published its fifth BEREC Report on the transparency and comparability of tariffs in December 2017.

This report covers the results of the questionnaire regarding the implementation of RLAH with a fair-use policy and sustainability applications, in line with the amendments to the TSM Regulation. In the questionnaire for NRAs, BEREC focused on information about complaints received by NRAs on transparency issues between July 2016 and July 2017. BEREC included specific questions about those complaints received after 15 June 2017 related to the application of RLAH and associated fair-use policies. The questionnaire for operators focused on seeking information about the tariff structures offered, including default regulated tariffs in accordance with Article 6a (RLAH), RLAH+³⁰, alternative roaming tariffs in accordance with Article 6e(3) and those tariffs in which roaming has not been offered since RLAH has been in force. Moreover, BEREC has collected information about the fair-use policies implemented by roaming providers and about the information given to customers on the use of the tariffs and their fair-use policies.

The report shows that 53 roaming providers in 16 NRAs applied for the authorisation to apply roaming surcharges in addition to the domestic retail price to ensure the sustainability of their domestic charging models in accordance with Article 6c of the Roaming Regulation. Of these applications, 30 were authorised, 12 are still pending and 11 were refused.

³⁰ Since 15 June 2017 (when RLAH was implemented), RLAH+ has referred to those operators who have the authorisation to apply a surcharge according to the sustainability mechanisms or to those users that exceeded or did not comply with the fair-use policies.

Document:

BoR (17) 230 – BEREC Report on the transparency and comparability of international roaming tariffs

2.2.6 Opinion on Phase II cases

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

In 2017, the handling of Article 7/7a Phase II procedures remained an essential part of BEREC's work and the downwards trend of recent years was reversed in 2017. During 2017, the European Commission opened eight Article 7/7a Phase II cases, compared with four cases in 2016. BEREC responded in a timely manner to five cases that required an expert opinion in 2017. Three cases opened in 2017 were discontinued before a BEREC Opinion was approved, following withdrawals of the relevant notification by the NRA concerned.

All the cases are outlined in the table below.

A. Case NL/2017/1960 – the Netherlands

Market	Market for wholesale high-quality access provided at a fixed location (WHQAFL) (market 4) in the Netherlands
Description	<p>Phase II was opened under Article 7 on 10 February 2017.</p> <p>The BEREC Opinion was adopted on 9 March 2017 and published on 15 March 2017.</p> <p>BEREC considered that the Commission's serious doubts regarding the draft decision of the Dutch NRA (ACM) on the WHQAFL market in the Netherlands and, in particular, regarding the proposed product market definition and SMP assessment for the WHQAFL market in the Netherlands were justified. BEREC considered that the evidence submitted by ACM appeared to point towards the existence of at least two separate markets for WHQAFL. In this sense, BEREC shared the Commission's serious doubts on the existence of a single market for WHQAFL. BEREC also noted that the identification of separate product markets could potentially lead to a different outcome in terms of SMP assessment.</p>
Outcome	The notification was withdrawn by ACM on 10 March 2017
Document	BoR (17) 53 – BEREC Opinion on Phase II investigation pursuant to Article 7 of Directive 2002/21/EC as amended by Directive 2009/140/EC: Case NL/2017/1960 – Wholesale high-quality access provided at a fixed location (market 4) in the Netherlands

B. Case DE/2017/1961 – Germany

Market	Market for wholesale call termination on individual public telephone networks provided at a fixed location (market 1) in Germany
Description	<p>Phase II was opened under Article 7a on 23 February 2017.</p> <p>The BEREC Opinion was adopted on 5 April 2017 and published on 7 April 2017.</p> <p>BEREC considered that the Commission's serious doubts regarding the draft decision of the German NRA (BNetzA) on the need to ensure that customers derive maximum benefits in terms of efficient cost-based termination rates and that fixed termination rates (FTRs) promote competition were justified.</p> <p>BEREC was of the opinion that BNetzA had not provided sufficient or reasonable justification for not using the pure bottom-up long-run incremental cost (BU-LRIC) approach. BEREC agreed with the Commission that the Termination Rates Recommendation (TRR) should lead to a harmonisation of approaches, rather than a harmonisation of rates. Furthermore, BEREC found that the use of a benchmark was not justified in this case, given the requirements in the TRR. BNetzA suggested that the reduction of the FTR would be too strong with the adoption of pure BU-LRIC, but BEREC showed that this reduction was in line with reductions in other Member States.</p>
Outcome	<p>On 23 June 2017, the European Commission issued a recommendation that BNetzA should amend or withdraw the remedies relating to price caps for fixed call termination services in Germany to ensure that FTRs are based on a pure BU-LRIC methodology.</p> <p>BNetzA adopted the final decision and published a Reasoned Justification in accordance with Article 7a(7) and Article 19(2) of the Framework Directive (2002/21/EC) for not following the recommendation.</p>
Document	BoR (17) 68 – BEREC Opinion on Phase II investigation pursuant to Article 7a of Directive 2002/21/EC as amended by Directive 2009/140/EC: Case DE/2017/1961 – Market for wholesale call termination on individual public telephone networks provided at a fixed location (market 1) in Germany

C. Case DE/2017/1997 – Germany

Market	Market for wholesale call termination on individual public telephone networks provided at a fixed location (market 1) in Germany
Description	<p>Phase II was opened under Article 7a on 7 July 2017.</p> <p>The BEREC Opinion was adopted on 17 August 2017 and published on 18 August 2017.</p>

	<p>BEREC considered that the Commission's serious doubts regarding the draft decision of BNetzA on the need to ensure that customers derive maximum benefits in terms of efficient cost-based termination rates and that FTRs promote competition were justified.</p> <p>BEREC was of the opinion that BNetzA had not provided sufficient or reasonable justification for not using the pure BU-LRIC approach. BEREC agreed with the Commission that the TRR should lead to a harmonisation of approaches, rather than a harmonisation of rates. Furthermore, BEREC found that the use of a benchmark was not justified in this case, given the requirements in the TRR. BNetzA suggested that the reduction of the FTR would be too strong with the adoption of pure BU-LRIC, but BEREC showed that this reduction was in line with reductions in other Member States.</p>
Outcome	<p>On 10 October 2017, the European Commission issued a recommendation that BNetzA should amend or withdraw the remedies relating to price caps for fixed call termination services in Germany to ensure that FTRs are based on a pure BU-LRIC methodology.</p> <p>BNetzA adopted the final decision and published a Reasoned Justification in accordance with Article 7a(7) and Article 19(2) of the Framework Directive (2002/21/EC) for not following the recommendation.</p>
Document	BoR (17) 155 – BEREC Opinion on Phase II investigation pursuant to Article 7a of Directive 2002/21/EC as amended by Directive 2009/140/EC: Case DE/2017/1997 – Market for wholesale call termination on individual public telephone networks provided at a fixed location (market 1) in Germany

D. Case SK/2017/2010 – Slovakia

Market	Market for wholesale voice call termination on individual mobile networks (market 2) in Slovakia
Description	<p>Phase II was opened under Article 7a on 24 October 2017.</p> <p>The BEREC Opinion was adopted on 5 December 2017 and published on 8 December 2017.</p> <p>BEREC was of the opinion that the Slovakian NRA (RÚ) failed to demonstrate cost differences outside the control of SWAN Mobile that could justify a deviation from the efficient cost. Therefore, BEREC agreed with the Commission's serious doubts, namely that the higher MTRs for SWAN Mobile resulting in a price asymmetry did not comply with the Regulatory Framework.</p> <p>Furthermore, BEREC was of the view that RÚ had not put forward sufficient justification of why the circumstances of SWAN Mobile</p>

	<p>were sufficiently different to justify different treatment with respect to its termination rates.</p> <p>Regarding the serious doubt concerning the WACC calculations, BEREC found that there is no evidence to support the inclusion of a size premium when calculating the WACC using the CAPM to derive the cost of equity, as RÚ has done.</p> <p>With respect to the creation of barriers to the internal market, BEREC was of the view that RÚ had not adequately justified different treatment regarding the termination rates of SWAN Mobile, and therefore shared the Commission's serious doubts.</p>
Outcome	<p>On 22 February 2018, the European Commission issued a Recommendation that RÚ should amend or withdraw the remedies relating to price caps for mobile call termination services in Slovakia in order to ensure that mobile termination rates are set at a symmetric level corresponding to the costs of an efficient operator.</p> <p>The notification was withdrawn by RÚ on 23 March 2018.</p>
Document	BoR (17) 251 – BEREC Opinion on Phase II investigation pursuant to Article 7a of Directive 2002/21/EC as amended by Directive 2009/140/EC: Case SK/2017/2010 – Market for wholesale voice call termination on individual mobile networks (market 2) in Slovakia

E. Case AT/2017/2020 – Austria

Markets	Wholesale markets for broadcasting transmission services (market 18 of the 2007 Recommendation) in Austria
Description	<p>Phase II was opened under Article 7 and 7a on 13 November 2017. The BEREC Opinion was adopted on 11 December 2017 and published on 12 December 2017.</p> <p>BEREC considered that the Commission's serious doubts pursuant to Article 7 of the Framework Directive regarding the draft decision of the Austrian NRA (KommAustria) on wholesale markets for broadcasting transmission services in Austria were justified.</p> <p>Concerning the definition of the relevant market, BEREC agreed that the radio broadcasting transmission services provided to the public broadcaster ORF by its vertically integrated and controlled subsidiary SMP operator (ORS) should be considered to be part of the same market as external supply. BEREC considered that self-supply and external supply were indistinguishable from a consumer perspective (i.e. the listeners) and that the services provided by the public radio broadcaster and the private radio broadcasters to the consumers were functionally similar and interchangeable, irrespective of the fact that the programmes of ORF were broadcast to fulfil the public service obligation enshrined in national law.</p>

	A separate opinion on the serious doubts expressed by the Commission pursuant to Article 7a of the Framework Directive was not issued, as the insertion of such self-supply in the relevant market could, in this particular case, be crucial to imposing the non-discrimination obligation, which should capture both the services provided internally and those offered to other wholesale customers.
Outcome	On 12 January 2018, the European Commission imposed a veto
Document	BoR (17) 263 – BEREC Opinion on Phase II investigation pursuant to Article 7 of Directive 2002/21/EC as amended by Directive 2009/140/EC: Case AT/2017/2020 – Wholesale markets for broadcasting transmission services (market 18) in Austria

F. Cases FI/2017/1991-1992 – Finland

Markets	Wholesale local access provided at a fixed location (market 3a) Wholesale central access provided at a fixed location for mass-market products (market 3b)
Description	Phase II was opened under Article 7a of the Framework Directive on 3 July 2017
Outcome	FICORA withdrew its notifications on 4 July 2017
Document	No BEREC Opinion was issued

G. Cases RO/2017/2017-2018 – Romania

Markets	Wholesale call termination on individual public telephone networks provided at a fixed location (market 1) Wholesale voice call termination on individual mobile networks (market 2)
Description	Phase II was opened under Article 7a of the Framework Directive on 10 November 2017
Outcome	ANCOM withdrew its notification on 14 November 2017
Document	No BEREC Opinion was issued

H. Case PT/2017/2023 – Portugal

Market	Call origination on the public telephone network provided at a fixed location in Portugal (market 2 of the 2007 Recommendation)
Description	Phase II was opened under Article 7 of the Framework Directive on 20 November 2017
Outcome	ANACOM withdrew its notification on 24 November 2017
Document	No BEREC Opinion was issued

2.3 Empowering and protecting end-users

2.3.1 Current definition and provision of universal service

According to Article 15 of the Universal Service Directive, the Commission must periodically review the scope of universal service in the light of social, economic and technological developments.

The European Commission started working on potential revisions to the universal service provisions in 2014. At this time, BEREC launched a questionnaire on behalf of the European Commission and, based on the results, adopted an internal report on the implementation and application of the universal service provisions by NRAs. In September 2016, the European Commission's proposal for the review of the electronic communications framework included a review of the universal service provisions.

Following these developments, this report provides an update to the 2014 internal report, reviewing the current state of implementation of the universal service provisions by members of BEREC. The report incorporates responses from a total of 31 NRAs, including from all EU Member States except Belgium, as well as from four non-EU countries (Iceland, Montenegro, Norway and Switzerland).

As regards implementation, the report notes that at least one universal service provider has been designated in each one of the respondent countries, with the exception of Germany, Estonia, Luxembourg, Poland, Romania and Sweden. However, as the Universal Service Directive requires Member States to ensure that the relevant services are made available, non-designation of a universal service provider does not necessarily imply that the requirements are not met if such services are available through normal commercial provision.

Although, in some countries, there is no compensation fund in place, the most commonly found method of funding the universal service obligation (USO) net costs is via sectoral funding. Of the 19 cases in which operators contributed to the compensation fund, in only two countries were all operators obliged to contribute, while in the remaining countries only some operators were required to contribute, through a minimum income, revenue or turnover threshold.

Concerning the scope of universal service, fixed access is the service most frequently found, but subscriber directories, directory enquiry services, public payphones and measures for disabled end-users are also prevalent elements. In only a limited number of cases (10) have countries added services that are outside the basic scope explicitly laid out in the Universal Service Directive. In most cases, the USO is provided at the national level.

In comparison with the data provided in the 2014 report, there are no significant variations in access to fixed telephony. Only Latvia has removed this service from the scope of the USO since the previous report was published. With regard to directory enquiry and telephone directory services, of the 10 and 12 countries, respectively, that were running these services through the universal service mechanism in 2014, four countries have now removed them from the scope of the USO (Latvia, Malta, Netherlands and Norway) and three have estimated that these services could

efficiently be provided through market mechanisms (Austria, France and Germany). Public payphones are still included in 14 countries, whereas four countries (Cyprus, France, Norway and Slovakia) have removed them since 2014. There has also been a slight increase in the number of countries that have established measures targeting users with disabilities, from 22 in 2014 to 25 in 2017.

Finally, the report finds that, with regard to the broadband section of the questionnaire, relatively few countries included a broadband connection within the scope of the USO. However, a significant number of countries are taking measures, at the national level, that are outside the scope of the USO but aim to provide end-users with a functional or high-quality broadband connection.

Document:

BoR (17) 41 – BEREC update survey on Member States' recent experience in terms of universal service

2.3.2 Implementation of Regulation 2015/2120 and Net Neutrality Guidelines

In 2017, BEREC published a report providing an overview of the activities of the NRAs regarding the implementation of the net neutrality provisions of Regulation (EU) 2015/2120 and the associated BEREC Net Neutrality Guidelines. This report reflects the first year of the application of the Regulation, namely from 30 April 2016 to 30 April 2017, and is based on information from the replies of 30 NRAs to an internal questionnaire, information published by NRAs in their national reports on the first year of the application of the Regulation and descriptions of publicly known net neutrality cases or investigations. However, this report is not an exhaustive account of the actions in the field regarding net neutrality since April 2017 and of ongoing cases.

Concerning Article 3 of the Regulation, which relates to end-users' rights to open internet access, the report shows that the following activities have been the most common among NRAs: the analysis of complaints or end-user reports, information requests submitted to internet service providers (ISPs) and market surveys conducted without requesting information from ISPs (e.g. by checking ISPs' offers on their websites). All NRAs have been monitoring the commercial and technical conditions of the provision of IASs. Zero-rating offers have been identified by 25 NRAs, with music streaming and social networking the most frequently mentioned types of applications being zero rated. Traffic management practices have been assessed formally by a small number of NRAs. Some NRAs are undertaking monitoring activities to investigate so-called 'specialised services'.

Concerning Article 4 on the transparency of contractual terms, most of the NRAs have conducted activities, including formal and informal requests for information from ISPs and conducting market surveys without requesting information from ISPs. NRAs already have national specifications for the different types of speed information required under Article 4, such as maximum, normally available and minimum speeds. Although the Regulation has been in place for more than a year now, there are still countries in which ISPs have not yet included speed information in contracts.

Finally, concerning Article 5, a large majority of NRAs are monitoring the availability of high-speed IAS through market surveillance without requesting ISPs, by requesting information from ISPs, by conducting IAS speed measurements and/or by analysing complaints and end-user reporting.

This report demonstrates a consistent treatment by NRAs of practices relating to the core principles of net neutrality, such as the ban on blocking of applications and discriminatory treatment of specific traffic. The exchange of information and knowledge, in particular exchanges on specific cases of implementation of the Regulation, initiated both at the level of the Net Neutrality EWG and in plenary meetings, and to be continued in the coming years, ensures such a coherent application of the Regulation.

BEREC also concludes that the Net Neutrality Guidelines are well suited to helping NRAs to perform their tasks of supervision and enforcement, as set out in Article 5 of the Regulation. The report notes that the evaluation of Regulation (EU) 2015/2120 by the Commission will be conducted by 30 April 2019 and that, in late 2018, BEREC will provide the Commission with an evaluation report on its experience with the application of the Regulation and the Net Neutrality Guidelines.

Document:

BoR (17) 240 – Report on the implementation of Regulation (EU) 2015/2120 and the BEREC Net Neutrality Guidelines

2.3.3 Regulatory assessment of quality of service in the context of net neutrality

BEREC published the Net Neutrality Regulatory Assessment Methodology to provide guidance to NRAs on the monitoring and supervision of the net neutrality provisions of Regulation (EU) 2015/2120 and to contribute to the standardisation of net neutrality measurement methodology.

The methodology builds on previous BEREC guidance regarding IAS quality monitoring. As proposed in the 2012 BEREC Guidelines for quality of service in the scope of net neutrality, the measuring methods encompass both IAS as a whole and individual applications using IAS. The aim of the methodology is to assess the performance of IAS services, on the one hand, and to detect traffic management practices applied to or having an impact on IAS services, on the other hand.

Furthermore, BEREC published the Net Neutrality Measurement Tool Specification, which builds on the high-level architecture recommended in the feasibility study; this report gives further details of this system specification. The architecture is based on the large-scale measurement of broadband performance (LMAP) specifications provided by the Internet Engineering Task Force (IETF) and takes into account variations across Europe in terms of NRA jurisdictions, NRA remit and the presence of existing NRA measurement systems.

The net neutrality measurement tool is specified to support harmonised measurement metrics and methodologies in a federated platform for measurements of IAS quality. It

also provides a basis for further research into the area of net neutrality supervision in a cost-efficient manner over the long term. At Plenary 3 2017, the Board of Regulators (BoR) decided to move forwards with initiating the development of a net neutrality measurement tool based on this specification. The objective is to implement it in 2019.

Document:

BoR (17) 178 – Net Neutrality Regulatory Assessment Methodology

2.3.4 Net neutrality supervision tools and methods

In 2016, BEREC published its Net Neutrality Guidelines as mandated by Regulation (EU) 2015/2120. The Regulation also prescribes that NRAs must ‘closely monitor and ensure compliance’ with the Regulation and that NRAs must ‘publish reports on an annual basis regarding their monitoring and findings’.

One of the ways in which NRAs might identify contractual, commercial and technical practices introduced by ISPs at the national level and assess their compliance with the provisions of Article 3 of the Regulation is through the use of detection tools and methods, in particular the following three: network diagnostic tests, processing of end-user reporting and/or complaints, and regulatory surveys.

BEREC reports on and analyses existing tools and suggests best practices. It includes a technical and commercial practices investigation (TCPI) template, similar to the one used in the BEREC–European Commission 2012 Traffic Management Investigation. The TCPI template can be valuable for the preparation of the national annual net neutrality reports, as it means reports have a common scope of information.

Document:

BoR (17) 241 – BEREC Report on tools and methods used to identify commercial and technical practices for the implementation of Article 3 of Regulation (EU) 2015/2120 (‘the Supervision report’)

2.4 Horizontal and regulatory quality aspects

2.4.1 Review of the BEREC Strategy 2018-2020

The BEREC Strategy guides BEREC’s work in the medium term and serves as the blueprint for BEREC’s annual work programmes.

In 2017, BEREC reviewed its strategy for the period 2018-2020 with the aim of taking into account the main market and technological developments. For this reason, BEREC held a public consultation in June 2017 and, based on this consultation, it finalised its strategy in October 2017.

The final version maintains the overarching strategic objectives of the previous strategy, namely promoting competition and investment, promoting the internal market, and empowering and protecting end-users.

It also defines five strategic priorities specifically for the period 2018-2020, which will orientate BEREC's work during this period:

1. responding to connectivity challenges and to new conditions for access to high-capacity networks;
2. monitoring potential bottlenecks in the distribution of digital services;
3. enabling 5G and promoting innovation in network technologies;
4. fostering a consistent approach to the net neutrality principles;
5. exploring new ways of boosting consumer empowerment.

In addition, the new strategy outlines a number of ways in which BEREC will continue to improve its work and adapt to new challenges, in particular relating to its output, efficiency and stakeholder engagement.

While this strategy is drafted on the basis of the current regulatory framework, BEREC acknowledges the need for ongoing review and stands ready to adapt its work to the new framework.

Documents:

BoR (17) 110 – BEREC Report on the outcome of the consultation on the draft BEREC Medium Term Strategy for 2018-2020

BoR (17) 174 – BEREC Report on the outcome of the consultation on the draft BEREC Medium Term Strategy for 2018-2020

BoR (17) 175 – BEREC Strategy 2018-2020

2.4.2 Benchmarking of termination rates

Following the work started by the European Regulators Group, BEREC has been collecting and publicly reporting information on MTRs. Data collection on FTRs and SMS termination rates started in 2011. The termination rate benchmarking exercises have been developed in close cooperation with the Communications Committee (COCOM), and from 2013 the Commission has made use of the BEREC termination rate data in its annual publications on the telecommunications industry in Europe (DAS). The purpose of this comparison is to provide an indication of the level of FTRs, MTRs and SMS termination rates in the countries represented within BEREC, as well as of their variations and the cost model adopted for the definition of termination rates.

In 2017, BEREC twice collected termination rate data from its members and observers to monitor the changes in termination rates and to collect information on the regulatory mechanisms used in determining them.

BEREC published two termination rate benchmark reports in 2017. The report on FTRs and MTRs in the EU (from 1 January 2017) was approved at the 31st plenary meeting, and the report on termination rates at the European level (from 1 July 2017) was approved at the 33rd plenary meeting.

Documents:

BoR (17) 101 – BEREC Report on termination rates at European level (January 2017)

2.4.3 Regulatory accounting in practice

The regulatory accounting annual report summarises the findings of a detailed survey of regulatory accounting systems across Europe and covers the implementation of regulatory cost accounting methodologies. It describes the state of play in terms of remedies of market regulation and focuses on price control and the way in which it is defined in practice. The report also describes national structural parameters and weighted average cost of capital (WACC) methodologies applied by NRAs.

The document provides an up-to-date 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 each year are included.

The report focuses on the analysis of wholesale line rental and the following key wholesale markets: wholesale local access (market 3a), wholesale central access (market 3b) and wholesale high-quality access (market 4). Moreover, the cost base and allocation methodologies used for fixed (market 1) and mobile (market 2) termination markets are reported³¹.

Furthermore, to include factors influencing NRAs' regulatory strategies, additional structural data (e.g. population, market and competitive structure, infrastructure) have been collected. Differences in market/competitive conditions and different infrastructure roll-outs can be observed among the respondent countries; this reflects the different external and technical requirements that NRAs need to take into account.

The report also looks at the annualisation methodologies provided by the respondent NRAs. As in last year's report, accounting information for some products in market 3a, such as copper access (including local loop unbundling (LLU), shared access, sub-loop unbundling), fibre access (LLU, VULA), dark fibre access and duct access, have been further analysed.

The report includes an updated section on the actual implementation of the TRR (2009/396 of 7 May 2009) and an evaluation of the implementation of Recommendation 2013/466/EU on consistent non-discrimination obligations and costing methodologies.

The current report provides an extended survey about WACC parameters focusing on market 3a. The WACC section summarises the main methodologies currently used by NRAs and sets out the reasons why each of the parameters needed to evaluate the cost of capital under the Capital Asset Pricing Model was selected.

The WACC plays an important role in setting cost-oriented regulated prices because it determines the reasonable rate of return on the capital employed. Regulated prices should provide the regulated firm with the opportunity to finance (efficient) investments and provide access seekers with efficient 'build-versus-buy' price signals. An increase (or decrease) in WACC will, with all other things equal, increase (or decrease)

³¹ The report takes into account the new version of the relevant market recommendation as adopted by the Commission on 9 October 2014 (2014/710/EU).

regulated prices. Even minor changes in the WACC can influence the regulated prices significantly, given that the telecommunications sector is very capital intensive³².

Document:

BoR (17) 169 – BEREC Report Regulatory Accounting in Practice 2017

2.4.4 Non-residential market indicators for the Digital Scoreboard

The goal of this BEREC Report was to propose a set of indicators to the European Commission that could be included in the questionnaire that is used for the Digital Scoreboard.

By proposing a common set of indicators to the European Commission that could be benchmarked, the intention of this initiative was to estimate the size of the non-residential market in Europe. Through discussion between BEREC and the European Commission, it was agreed that the proposed set of indicators should reflect the non-residential market in the coming years and should be useful for measuring the initiative set out in the Commission's Gigabit Society.

The Commission's interests with respect to this BEREC exercise were twofold: on the one hand, the indicators that were of most interest to the Commission could contribute to its reporting on connectivity targets up to 2025 and, on the other hand, the Commission has placed a clear focus not only on consumers (i.e. the residential market) but also on businesses (i.e. the non-residential market). The Commission has stated in its objectives that vastly improved connection speeds for businesses, all schools, transport hubs and main providers of public services is a target for 2025.

The report defines a set of eight indicators that could be used by the Commission in its annual collection of data exercise. BEREC will conduct its own internal benchmarking exercise in 2018, based on another set of eight indicators, to provide an estimation of the non-residential market.

Document:

BoR (17) 243 – Report on non-residential market indicators for the European Commission's Digital Scoreboard

3 Representation and cooperation

3.1 Events, speeches and presentations

Since its creation, BEREC has been committed to developing close contacts with stakeholders and interested parties, as well as EU institutions, EU bodies and groups such as the EU Agency for Network and Information Security (ENISA) and the RSPG. This dialogue with stakeholders and EU institutions has been particularly important this year with the review of the regulatory framework. In 2017, BEREC has also been

³² For the local access market, for example, a 1% change in the WACC could change regulated wholesale prices by 5-10%.

committed to further strengthening its relationship with stakeholders and citizens by developing early public consultations and implementing new tools to facilitate contributions to its consultations.

As a result, the BEREC Chair, Vice-Chairs and other representatives, such as the EWG Chairs, represented BEREC at a wide range of events in 2017. The speeches and presentations given focused on a wide range of topics, from BEREC's ongoing work on the review of the regulatory framework to net neutrality issues and more prospective topics on the future of the Net Neutrality Regulation. Annex 8 lists the events attended by the BEREC Chair, Vice-Chairs and other representatives.

3.2 Workshops

In 2017, BEREC organised two workshops. On 1 February 2017, BEREC held an expert workshop on the Internet of Things (IoT) in Brussels, with live streaming on the BEREC website. Dedicated to the topic 'Enabling the IoT', the event brought together experts and stakeholders to discuss the solutions required to ensure a large-scale and sustainable IoT roll-out, with the aim of delivering significant benefits to citizens and consumers across different industries, and the regulatory implications of this. While telecommunications-specific topics (such as scarce resources and interoperability) were tackled, the workshop also considered broader issues pertaining to innovation and investment, consumer rights and data privacy. Preceding the 30th plenary meeting on 23 February 2017, BEREC organised an internal workshop on the regulatory framework review, paying particular attention to end-users' protection, spectrum and BEREC's institutional set-up.

Annex 7 lists the BEREC workshops conducted in 2017.

3.3 BEREC Stakeholder Forum

The fifth annual BEREC Stakeholder Forum meeting was held on 18 October 2017 in Brussels. The event was organised under the leadership of Vice-Chair Stephen Unger (Ofcom) and it was attended by 156 participants. The incoming BEREC Chair for 2018, Johannes Gunzl (RTR), presented the draft BEREC Work Programme for 2018, which was prepared in accordance with the strategic priorities defined in BEREC's Medium Term Strategy for 2018-2020.

The forum was organised into two panel discussions. The first session was dedicated to new models of investments and ways to incentivise new models of investment and competition in the access framework. This session was moderated by Henk Don, a member of the board of the Dutch regulator ACM, and welcomed the following panellists: Maxime Lombardini, CEO of Iliad; Brad Burnham, Co-founder of Union Square Ventures; Filipa Carvalho, Director for Regulation at NOS; Alistair Davison, Director at the Wireless Infrastructure Group; and Richard Feasey, an independent consultant.

During this session, many participants highlighted that competition and investment can work together, that they are not opposed. They discussed case studies from both within Europe and elsewhere and noted that models of investment may vary significantly and that regulation is needed but should be considered on a case-by-case basis: NRAs are best positioned to come up with appropriate and targeted solutions that are consistent with the specific situation of their national markets. The discussion highlighted the need for policy makers to remain aware of the relationship between investment and end-user demand when considering new investment models.

The second session focused on the issue of how regulators should balance setting consumer safeguards with the need to foster innovation, specifically in the context of the increasing degree of convergence of content and traditional ECS and with new players entering this converging market. The session was moderated by Sara Andersson, Director of the Swedish regulator PTS. The session benefited from the insights of professionals from various sectors: Kevin Martin, Vice-President of Mobile and Global Access Policy at Facebook; Michael Bryan-Brown, Managing Director of Regulation and Competition Policy at Liberty Global; Guillermo Beltrà, the Head of the Legal and Economic Department at BEUC; and David Jevons, Partner at Oxera.

During this session, the panel discussed the need to focus on the principle of defining potential consumer harm, given the complexity of the current – and most likely the future – ecosystem. The discussion also focused on the issue of what influences consumers when choosing services, noting that even services that appear to be comparable might, in fact, differ significantly. The panel agreed on the need to take these factors into account when protecting against new consumer harm.

Between the two panel discussions, the BEREC Chair, Sébastien Soriano (ARCEP), delivered a keynote address in which he addressed two fundamental misrepresentations: (i) deregulation is good for investment and (ii) NRAs have a conservative mindset and are preoccupied by competition and lower retail prices. He asserted that the role of regulation is to provide predictability and to illuminate the environment for service providers. Moreover, he stressed that regulators are tuned to new social demands and political objectives and are not focused on past issues. He noted, in this regard, that in 2017 BEREC has been focusing on enabling connectivity and on safeguarding an open environment, but has also been increasingly looking at content and new emerging bottlenecks in the digital environment.

The forum was concluded by Vice-President Ansip. During his address, he stressed the importance of spectrum co-ordination in boosting investment in the roll-out of 5G throughout Europe. To this end, he noted that competition drives investment and that Europe clearly needs both of these and therefore needs a regulatory framework that is predictable and provides certainty. He highlighted that the review should therefore limit the number of new instruments.

He also stressed that we need to address licence duration and renewal if Europe is to achieve the level of investment it needs. He highlighted that BEREC has a role to play in assessing spectrum assignments, but also that there is a need for independent regulators. He noted that BEREC will ensure that decisions are consistent on connectivity, 5G and spectrum.

Finally, the Vice-President shared his views on consumer protection and was of the view that a high level of consumer protection must be ensured. He noted that this requires common rules, irrespective of the types of communication service used.

3.4 International cooperation

In 2017, BEREC has been maintaining close relationships with regional regulator groups and has also been developing joint activities with other regulators, such as the Telecom Regulatory Authority of India (TRAI).

With regard to this cooperation with the abovementioned groups of regulators, BEREC promoted several activities, as specified in the different memoranda of understanding (MoUs) that it signed.

In this sense, a multilateral summit between the Euro-Mediterranean Regulators Group (EMERG), the Eastern Partnership Electronic Communications Regulators Network (EaPeReg), the Latin American Forum of Telecommunications Regulators (Regutel) and BEREC took place on 1 and 2 June 2017 in Cascais, Portugal. This summit aimed to address the main challenges in ensuring connectivity in a convergent world. BEREC's participation in the summit included presentations on investment in ultra-high-capacity networks, net neutrality changes and mobile connectivity. Furthermore, following the summit, a joint declaration was signed by the participants reasserting the commitment of all the participants to ensuring connectivity for all and safeguarding an open internet. At the summit, BEREC also expressed its intention to extend each of the MoUs with the regulator groups that participated in the summit, as these were about to expire.

The specific activities that were undertaken with each of the regional regulators are outlined below:

1. Regutel

During 2017, this cooperation was enhanced through the participation of BEREC experts at two Regutel EWGs (i.e. the spectrum working group and the internet sub-group), which met from 27 to 29 March 2017 in Colombia. A technical seminar about connectivity also took place on the abovementioned dates, again with the participation of BEREC experts. Furthermore, Regutel's plenary meeting took place in Ciudad de México, Mexico, from 29 November to 1 December 2017, at which the President of the Mexican telecommunications regulator Instituto Federal de Telecomunicaciones took over the presidency for 2018. At this meeting, BEREC participated in a discussion panel about connectivity and its future challenges. Finally, after the plenary meeting, the MoU was extended on 13 December 2017 for 2 additional years.

2. EMERG

As set out in the MoU, an annual workshop was organised in Munich on 22 and 23 November on next-generation networks, network sharing and LLU. The

focus of the BEREC expert was on intervention in regulated wholesale access and evolution to FTTH: from LLU to VULA and duct access.

3. EaPeReg

The MoU with the Eastern Partnership (Armenia, Azerbaijan, Belarus, Georgia, the Republic of Moldova and Ukraine) was extended on 23 November 2017 for 2 additional years. Furthermore, an annual workshop dedicated to net neutrality took place in Minsk, Belarus, on 24 October 2017. BEREC was represented by the Net Neutrality EWG Co-Chair.

In addition, BEREC has also developed initiatives with other interlocutors, such as the Indian regulator TRAI. A videoconference took place on 29 November 2017 between the Net Neutrality EWG and experts from the Indian regulator. Discussions were also initiated between BEREC and TRAI to strengthen and officialise this relationship; a MoU that will give a framework to BEREC–TRAI joint activities is to be signed in 2018.

BEREC also organised two videoconferences with the Federal Communications Commission in 2017: one focused on broadband deployment (28 June 2017), with 18 NRAs participating, and another focused on 5G and spectrum (12 December 2017), with 20 NRAs attending.

By the end of 2017, BEREC had successfully accomplished its proposed international cooperation activities plan. This contributed not only to enhancing BEREC's visibility and influence, but also to promoting the European regulatory approach. It also allowed BEREC to keep abreast of other regions' regulatory know-how and to further develop its relationship with them, meaning it was more aware of its counterparts' positions.

BEREC international mission to India and enhanced cooperation with TRAI

BEREC organised an international mission to India (from 30 March to 4 April) to gain insights from a broad spectrum of organisations and to understand the sector's developments worldwide.

The BEREC delegation held meetings with operators (Bharti Airtel, Indus Towers, British Telecom, Beotel, Ozone WiFi, DEN and Vodafone), financial institutions (Qualcomm ventures and Ideaspriing capital), consultants (Price Waterhouse Coopers and Mu Sigma) and other players in the industry (ARM, EOXYs and Solutions Infini). The delegation also met the Internet Freedom Foundation, the Department of Telecommunications and TRAI.

The delegation mainly focused on net neutrality issues, recent structural changes in the mobile market and mobile infrastructure sharing. The mission gave the delegation the opportunity take a close look at the active and growing Indian digital environment.

3.5 Engagement with EU institutions

BEREC demonstrated its commitment to working in close cooperation with EU institutions in 2017. The BEREC Chair and Vice-Chairs met with representatives of the

European Commission on several occasions to discuss, in particular, the ongoing review of the regulatory framework for electronic communications. This topic was discussed at high-level meetings with Vice-President Ansip on 10 April 2017 and Commissioner Gabriel on 11 October 2017. The BEREC Chair also confirmed BEREC's commitment to maintaining an excellent working relationship with the European Commission and, before each plenary meeting, organised a videoconference with the Director General of DG Connect, Roberto Viola. As in previous years, BEREC provided regular inputs to the European Commission on termination rates and roaming.

BEREC maintained regular contact with the European Parliament and the Council. The BEREC Chair and Vice-Chairs met Members of the European Parliament (MEPs) on several occasions to discuss the ongoing framework review and to provide BEREC's views on this review, as outlined in the 13 technical inputs it published in April 2017. The BEREC Chair also participated in a European Parliament Industry, Research and Energy (ITRE) Committee meeting in March 2017 and welcomed a delegation of MEPs in Riga. The BEREC Chair and Vice-Chairs also met with the Council's presidency in November and December 2017.

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

4 Organisational issues

4.1 BEREC Chair and Vice-Chairs for 2019

The BoR appoints its Chair and Vice-Chairs from among its members. Pursuant to Article 4(4) of the BEREC Regulation, the term of office of the Chair and Vice-Chairs is 1 year. In compliance with Article 2(1) of the Rules of Procedure of the BoR, before serving his/her term as Chair for 1 year, the Chair must first serve as a Vice-Chair for 1 year. To ensure the continuity of BEREC's work, the Chair must also serve as a Vice-Chair for the year following his/her term as Chair.

In addition to the support provided to the Chair by the two Vice-Chairs (the outgoing and incoming Chairs), the BoR may decide to elect other members as additional Vice-Chairs for 1 year.

In accordance with the Rules of Procedure, during its final ordinary plenary meeting for 2016, the BoR decided to elect two additional Vice-Chairs for 2017. Following the elections, the BoR was led by the following Chair and Vice-Chairs in 2017:

BEREC Chair for 2017:

- Sébastien Soriano, President of ARCEP (France), elected Chair for 2017 at the 25th BEREC plenary meetings (10-11 December 2015, London).

BEREC Vice-Chairs for 2017:

- Johannes Gungl, Managing Director of RTR (Austria), elected Chair for 2018 at the 29th BoR plenary meetings (8-9 December 2016, Berlin)

- Wilhelm Eschweiler, Vice-President of BNetzA (Germany), elected Chair for 2016 at the 21st BoR meeting (4-5 December 2014, Brussels)
- Alejandra de Iturriaga Gandini, Director of CNMC (Spain)
- Stephen Unger, a board member of Ofcom (United Kingdom).

4.2 Election of BEREC Chair for 2019 and Vice-Chairs for 2018

Every year, the BoR appoints the Chair for the year after next and the Vice-Chairs for the following year. During its 33rd plenary meeting (7-8 December 2017, Copenhagen), in compliance with the procedure described above, the BoR elected Jeremy Godfrey, Chairperson of the ComReg (Ireland), as the BEREC Chair for 2019 and George Michaelides, Commissioner of OCECPR (Cyprus), and Dan Sjöblom, Director General of PTS (Sweden), as the BEREC Vice-Chairs for 2018.

Pursuant to the BoR Rules of Procedure, the elected Chair for 2019 (Jeremy Godfrey) and the outgoing Chair for 2017 (Sébastien Soriano), will serve as Vice-Chairs in 2018 to support Johannes Gunzl, the elected Chair for 2018.

4.3 BEREC working structure

Expert Working Groups

Following the successful reform of the structure of BEREC EWGs in 2014 and the appointment of EWG Co-Chairs in 2015, the streamlined structure proved to be effective, as it helped BEREC to work faster while still maintaining a very high level of quality. The benefits of the reform could, for example, be seen in the drafting and adoption of the BEREC Net Neutrality Guidelines.

As laid out in the internal arrangements, new EWG Co-Chairs were appointed in late 2017 based on a comparative evaluation of the candidates using specific criteria.

The organisational structure used to support BEREC's work in 2017 is presented in Annex 11.

BEREC main meetings

The BoR held four ordinary plenary meetings in 2017. Each of these was preceded 3 weeks beforehand by a meeting of the BEREC Contact Network (the intermediate structure of representatives of members and observers) to prepare the plenary.

Annex 12 lists the members and observers of the BoR and Annexes 5 and 6 list the BEREC BoR and Contact Network meetings that took place in 2017.

Annexes

Annex 1 Meetings with EU institutions and other EU bodies**A. Meetings with the European Commission (EC)**

Date/place	Event
16 January 2017, Brussels, Belgium	Meeting between the BEREC Chair and the Director General of DG Connect
20 February 2017, videoconference	Preparatory meeting of the 30th BEREC plenary meetings between the BEREC Chair and representatives of the EC
10 April 2017, Brussels, Belgium	Meeting between the BEREC Chair and the EC Vice-President
29 May 2017, videoconference	Preparatory meeting of the 31st BEREC plenary meetings between the BEREC Chair and representatives of the EC
20 July 2017, Brussels, Belgium	Meeting between the BEREC Chair and Vice-Chairs and the Director General of DG connect
2 October 2017, videoconference	Preparatory meeting of the 32nd BEREC plenary meetings between the BEREC Chair and representatives of the EC
11 October 2017, Brussels, Belgium	Meeting between the BEREC Chair and Vice-Chair (RTR) and Commissioner
1 December 2017, videoconference	Preparatory meeting of the 33rd BEREC plenary meetings between the BEREC Chair and representatives of the EC

Date/place	Event
13 December 2017 Brussels, Belgium	Meeting between the BEREC Vice-Chair (RTR) and the Director General of DG Connect

B. Meetings with the European Parliament (EP)

Date/place	Event
25 January 2017, Brussels, Belgium	Meeting between the BEREC Chair and MEPs
26 January 2017, Brussels, Belgium	Participation of the BEREC Chair in the public hearing of the EP ITRE Committee
26 January 2017, Brussels, Belgium	Meeting between BEREC Chair representatives (AGCOM/NMHH) and members of the EP Culture and Education Committee
1 March 2017, Brussels, Belgium	Meeting between the BEREC Chair and MEPs
22 March 2017, Brussels, Belgium	Participation of the BEREC Chair in the ITRE discussion on the new Telecom Code/BEREC Regulation
21 April 2017, Riga, Latvia	Meeting between the BEREC Chair and the ITRE Committee delegation at the BEREC Office in Riga
3 May 2017, Brussels, Belgium	Participation of the BEREC Chair in the EP debate 'Europe's 5G ambition: investing in 5G enabler infrastructure'

Date/place	Event
10 May 2017, Brussels, Belgium	Meeting between a BEREC Vice-Chair (CNMC) and MEPs
7 June 2017, Brussels, Belgium	Meeting between the BEREC Chair and Vice-Chairs and MEPs
8 November 2017, Brussels, Belgium	Meeting between the BEREC Chair and MEP

C. Meetings with the Council of the EU

Date/place	Event
10 May 2017, Brussels, Belgium	Meeting between a BEREC Vice-Chair (CNMC) and the Estonian minister of Entrepreneurship and Information Technology
8 November 2017, Brussels, Belgium	Meeting between the BEREC Chair and representatives of the Estonian presidency
14 December 2017, Brussels, Belgium	Meeting between the BEREC Vice-Chair (RTR) and the Chair of the Working Party on Telecommunication and Information Society at the Council

D. Meetings and workshops with other EU bodies

Date/place	Event
11 May 2017, Brussels, Belgium	Participation of a BEREC Vice-Chair representative (BNetzA) in the high-level meeting 'Interoperability to create the Internet of Energy'
14 December 2018, Brussels, Belgium	Meeting between the BEREC Vice-Chair (RTR) and the Permanent Representative of Austria to the European Union

Annex 2 Public debriefings and BEREC engagement with stakeholders

Date/place	Event
1 February 2017, Brussels, Belgium	BEREC workshop on 'Enabling the Internet of Things'
1 March 2017, Brussels, Belgium	Public debriefing on the outcomes of the 30th BEREC plenary meetings
7 June 2017, Brussels, Belgium	Public debriefing on the outcomes of the 31st BEREC plenary meetings
11 October 2017, Brussels, Belgium	Public debriefing on the outcomes of the 32nd BEREC plenary meetings
18 October 2017, Brussels, Belgium	Fifth BEREC Stakeholder Forum meeting
13 December 2017, Brussels, Belgium	Public debriefing on the outcomes of the 33rd BEREC plenary meetings

Annex 3 International events

Dates/place	Event
27-29 March 2017, Cartagena de Indias, Colombia	Participation of BEREC representatives in the seventh annual meeting of Regulatee working groups
29 March-5 April 2017, Delhi and Bangalore, India	BEREC Chair and Vice-Chairs' study trip to India
31 May 2017, Cascais, Portugal	Participation of the BEREC Chair in the BEREC/Regulatee/EaPeReg Summit
24-25 October 2017, Minsk, Belarus	Participation of a BEREC representative (ACM) in the third EaPeReg plenary meeting and workshop
22-23 November 2017, Brussels, Belgium	Participation of a BEREC Vice-Chair (CNMC) in the annual BEREC–EMERG Workshop

Annex 4 Meetings between the BEREC Chair, Vice-Chairs and Expert Working Group (EWG) Chairs

Dates/place	Event
12-13 January 2017, Riga, Latvia	Meeting between EWG Co-Chairs
19-20 January 2017, Nice, France	Meeting between the BEREC Chair and Vice-Chairs
8 February 2017, videoconference	Meeting between the BEREC Chair and Vice-Chairs
22 February 2017, Paris, France	Meeting between the BEREC Chair and Vice-Chairs
19 May 2017, videoconference	Meeting between the BEREC Chair and Vice-Chairs
31 May 2017, Cascais, Portugal	Meeting between the BEREC Chair and Vice-Chairs
5 July 2017, videoconference	Meeting between the BEREC Chair and Vice-Chairs
19 July 2017, Brussels, Belgium	Meeting between the EWG Co-Chairs
20-21 September 2017, Paris, France	Meeting between the BEREC Chair and Vice-Chairs

Dates/place	Event
4 October 2017, Bucharest, Romania	Meeting between the BEREC Chair and Vice-Chairs
22 November 2017, videoconference	Meeting between the BEREC Chair and Vice-Chairs
6 December 2017, Copenhagen, Denmark	Meeting between the BEREC Chair and Vice-Chairs
18-19 December 2017, Paris, France	Handover meeting between the BEREC Chair and Vice-Chairs

Annex 5 Plenary meetings of the Board of Regulators (BoR)

Dates/place	Event	Agenda	Conclusions
23-24 February 2017, Paris, France	30th BEREC BoR plenary meeting	BoR (17) 31 ³³	BoR (17) 58 ³⁴
1-2 June 2017, Cascais, Portugal	31st BEREC BoR plenary meeting	BoR (17) 100 ³⁵	BoR (17) 158 ³⁶
5-6 October 2017, Bucharest, Romania	32nd BEREC BoR plenary meeting	BoR (17) 167 ³⁷	BoR (17) 221 ³⁸
7-8 December 2017, Copenhagen, Denmark	33rd BEREC BoR plenary meeting	BoR (17) 226 ³⁹	BoR (17) 273 ⁴⁰

³³ http://berec.europa.eu/eng/document_register/subject_matter/berec/board_of_regulators_meetings/agendas/6723-draft-agenda-for-30th-berec-bor-plenary-meeting-23-24-february-2017-paris

³⁴ http://berec.europa.eu/eng/document_register/subject_matter/berec/board_of_regulators_meetings/meeting_conclusions/7010-conclusions-from-the-30th-ordinary-plenary-meeting-of-the-berec-board-of-regulators

³⁵ http://berec.europa.eu/eng/document_register/subject_matter/berec/board_of_regulators_meetings/agendas/7069-draft-agenda-for-31st-bor-plenary-meeting-1-2-june-2017-cascais

³⁶ http://berec.europa.eu/eng/document_register/subject_matter/berec/board_of_regulators_meetings/meeting_conclusions/7223-conclusions-from-the-31st-ordinary-plenary-meeting-of-the-berec-board-of-regulators

³⁷ http://berec.europa.eu/eng/document_register/subject_matter/berec/board_of_regulators_meetings/agendas/7267-draft-agenda-for-32nd-bor-plenary-meeting-5-6-october-2017-bucharest

³⁸ http://berec.europa.eu/eng/document_register/subject_matter/berec/board_of_regulators_meetings/meeting_conclusions/7429-conclusions-from-the-32nd-ordinary-plenary-meeting-of-the-berec-board-of-regulators

³⁹ http://berec.europa.eu/eng/document_register/subject_matter/berec/board_of_regulators_meetings/agendas/7469-draft-agenda-for-33rd-bor-plenary-meeting-7-8-december-2017-copenhagen-denmark

⁴⁰ http://berec.europa.eu/eng/document_register/subject_matter/berec/board_of_regulators_meetings/meeting_conclusions/7566-conclusions-from-the-33rd-berec-bor-plenary-meeting

Annex 6 Meetings of the Contact Network (CN) established prior to the Board of Regulators (BoR)

Dates/place	Event	Agenda	Conclusions
2-3 February 2017, Malmo, Sweden	1st BEREC CN meeting in 2017	BEREC CN (17) 01 ⁴¹	BEREC CN (17) 18 ⁴²
11-12 May 2017, Reykjavik, Iceland	2nd BEREC CN meeting in 2017	BEREC CN (17) 19 ⁴³	BEREC CN (17) 44 ⁴⁴
14-15 September 2017, Belgrade, Serbia	3rd BEREC CN meeting in 2017	BEREC CN (17) 45 ⁴⁵	BEREC CN (17) 72 ⁴⁶
16-17 November 2017, Malta	4th BEREC CN meeting in 2017	BEREC CN (17) 73 ⁴⁷	BEREC CN (17) 111 ⁴⁸

⁴¹ http://berec.europa.eu/eng/document_register/subject_matter/contact_network_meetings/agendas/6665-draft-agenda-for-the-berec-2017-1st-contact-network-meeting-2-3-february-2017-malmo-sweden

⁴² http://berec.europa.eu/eng/document_register/subject_matter/contact_network_meetings/meeting_conclusions/6886-conclusions-from-the-berec-2017-1st-contact-network-meeting-2-3-february-2017-malmo

⁴³ http://berec.europa.eu/eng/document_register/subject_matter/contact_network_meetings/agendas/7022-draft-agenda-for-the-berec-2017-2nd-contact-network-meeting-11-12-may-2017-reykjavik-iceland

⁴⁴ http://berec.europa.eu/eng/document_register/subject_matter/contact_network_meetings/meeting_conclusions/7119-conclusions-from-the-berec-2017-2nd-contact-network-meeting

⁴⁵ http://berec.europa.eu/eng/document_register/subject_matter/contact_network_meetings/agendas/7219-draft-agenda-for-the-berec-2017-3rd-contact-network-meeting-14-15-september-2017-belgrade-serbia

⁴⁶ http://berec.europa.eu/eng/document_register/subject_matter/contact_network_meetings/meeting_conclusions/7262-conclusions-from-the-berec-2017-3rd-contact-network-meeting

⁴⁷ http://berec.europa.eu/eng/document_register/subject_matter/contact_network_meetings/agendas/7421-draft-agenda-for-the-berec-2017-4th-contact-network-meeting

⁴⁸ http://berec.europa.eu/eng/document_register/subject_matter/contact_network_meetings/meeting_conclusions/7483-conclusions-from-the-4th-berec-cn-meeting-in-2017

Annex 7 Internal BEREC workshops

Date/place	Event
23 February 2017	BEREC internal workshop on the regulatory framework review
12 December 2018 via videoconference	BEREC-FCC workshop on spectrum.

Annex 8 Events attended by the BEREC Chair and/or Vice-Chairs on behalf of BEREC

Dates/place	Event
5-8 January 2017, Las Vegas, NV, USA	Participation of the BEREC Chair in the CES 2017 Conference
25 January 2017, Brussels, Belgium	Participation of the BEREC Chair in the MLex-ETNO Regulatory Summit 2017
31 January 2017, Brussels, Belgium	Participation of the BEREC Chair in the NetCompetition afterwork
14-16 February 2017, Marseille, France	Participation of a BEREC Vice-Chair (BNetzA) in the FTTH Council Europe Conference
26-28 February 2017, Barcelona, Spain	Keynote speech by the BEREC Chair at the EIF/GSMA High-Level Roundtable at the GSMA World Congress
21 March 2017, Brussels, Belgium	Opening interview by the BEREC Chair at the Politico event 'The Future Of The Wireless World'
26-28 March 2017, Chicago, IL, USA	Participation of the BEREC Chair in the 98th Internet Engineering Task Force meeting
3 May 2018, Brussels, Belgium	Participation of the BEREC Chair in the FTTH Council Europe European Parliament lunch debate
8 June 2017, London, United Kingdom	Participation of the BEREC Chair in the FT event 'Future of Media and Telecoms'

Dates/place	Event
8-9 June 2017, Athens, Greece	Participation of a BEREC Vice-Chair (RTR) in the EETT ninth international conference 'Electronic Communications & Postal Services in the Digital Single Market'
15-16 June 2017, Valletta, Malta	Participation of the BEREC Chair in the Digital Assembly 2017
20-21 June 2017, Brussels, Belgium	Keynote speech by the BEREC Chair at the 12th Annual European Spectrum Management Conference
17 July 2017, Kotor, Montenegro	Speech by the BEREC Chair at the Digital-born Media Carnival 2017
28-29 August 2017, Salzburg, Austria	Participation by the BEREC Chair in the RTR Telecoms Summit
29-30 August 2017, Stockholm, Sweden	Visit by the BEREC Chair to PTS
25-26 September 2017, Busan, South Korea	Participation of the BEREC Chair in ITU Telecom World
26 September 2017, Brussels, Belgium	Participation of BEREC representatives (CNMC/ARCEP) in a GSMA roundtable
27 September 2017, Brussels, Belgium	Participation of the BEREC Chair and a Vice-Chair (RTR) in the FT-ETNO Summit
2 October, 2017, Brussels, Belgium	Participation of a BEREC Vice-Chair (CNMC) in the PEER Regulatory Roundtable on Bundled Products

Dates/place	Event
4 October 2017, Bucharest, Romania	Participation of the BEREC Chair and Vice-Chairs in the ANCOM Conference 'Regulation 360° – from word to terabyte in 15 years'
9 October 2017, Brussels, Belgium	Participation by the BEREC Chair and a Vice-Chair (RTR) in the International Regulators Forum (IIC)
11 October 2017, Brussels, Belgium	Participation of a BEREC Vice-Chair (CNMC) in the Total Telecom conference 'Connected Europe'
18 October 2017, Brussels, Belgium	Participation of the BEREC Chair in the telecoms, media and technology sector conference 'Competition Law and Regulation'
19 October 2017, Brussels, Belgium	Participation of the BEREC Chair in the IRG Heads workshop
24 October 2017, Dublin, Ireland	Keynote speech by the BEREC Chair at the ComReg conference 'Telecommunications: Society and Sector in Transition'
7 November 2017, Lisbon, Portugal	Participation by the BEREC Chair in the Web Summit 2017
10 November 2017, Rome, Italy	Keynote speech by the BEREC Chair at the IIC Italian Chapter on the main regulatory challenges in the digital ecosystem
28 November 2017, Brussels, Belgium	Keynote speech by the BEREC Chair and a Vice-Chair (RTR) at the ECTA Regulatory Conference
29 November 2017, Brussels, Belgium	Participation of a BEREC Vice-Chair (RTR) in the fifth Transatlantic Digital Economy Conference

Dates/place	Event
19 December 2017, Geneva, Switzerland	Participation of the BEREC Chair in the annual Internet Governance Forum

Annex 9 Publicly available documents approved by the Board of Regulators (BoR) in 2017

A. BEREC Opinions

Document number	Description	Date
BoR (17) 53	BEREC Opinion on Phase II investigation pursuant to Article 7 of Directive 2002/21/EC as amended by Directive 2009/140/EC: Case NL/2017/1960 – Wholesale high-quality access provided at a fixed location (market 4) in the Netherlands	15 March 2017
BoR (17) 68	BEREC Opinion on Phase II investigation pursuant to Article 7a: Case DE/2017/1961	5 April 2017
BoR (17) 83	Promoting investment, protecting competition, and preserving the integrity of the SMP framework	10 May 2017
BoR (17) 84	BEREC views on non-competitive oligopolies in the Electronic Communications Code	28 March 2017
BoR (17) 87	BEREC views on Article 74 of the draft Code 'Co-investment and "very high-capacity (VHC) networks"'	10 May 2017
BoR (17) 88	BEREC views on Article 77 of the draft Code 'Vertically separate undertakings'	10 May 2017
BoR (17) 89	BEREC views on the double lock veto in the Commission's proposal and ITRE draft Report	27 April 2017
BoR (17) 90	BEREC views on duration, on renewal of rights and on coordinated timing of assignments (Articles 49, 50 and 53)	28 March 2017
BoR (17) 91	BEREC paper on the Commission's proposals for an EECC Spectrum Provisions – Implementing Acts	27 April 2017

Document number	Description	Date
BoR (17) 92	BEREC views on information gathering powers	10 May 2017
BoR (17) 93	BEREC views on Articles 12 and 16 of the draft Codes 'Notification process' and 'Administrative charges'	10 May 2017
BoR (17) 94	BEREC views on the draft report elaborated by ITRE Rapporteur Evžen Tošenovský on the proposal for a Regulation of the European Parliament and of the Council establishing the Body of European Regulators for Electronic Communications	28 March 2017
BoR (17) 129	Peer review process (Article 35)	30 May 2017
BoR (17) 115	BEREC response to the public consultation from the EC on the update of the SMP Guidelines	2 June 2017
BoR (17) 155	BEREC Opinion on Phase II investigation: Case DE/2017/1997	17 August 2017
BoR (17) 166	BEREC input on weighted average of maximum mobile termination rates	5 October 2017
BoR (17) 202	BEREC views on ITRE proposals introducing a country of establishment principle under the Code	24 October 2017

Document number	Description	Date
BoR (17) 203	BEREC views on the Universal Service regime, as in the Commission's proposals and IMCO Opinion	24 October 2017
BoR (17) 251	BEREC Opinion on Phase II investigation: Case SK/2017/2010	11 December 2017
BoR (17) 263	BEREC Opinion on Phase II investigation: Case AT/2017/2020	15 December 2017

B. BEREC Reports

Document number	Description	Date
BoR (17) 40	Summary report on the outcomes of the workshop on IoT technologies and their impact on regulation	24 February 2017
BoR (17) 101	Termination rates at European level January 2017	1 June 2017
BoR (17) 102	International Roaming BEREC Benchmark Data Report April-September 2016	1 June 2017
BoR (17) 110	BEREC Report on the outcome of the consultation on the Draft BEREC Medium Term Strategy for 2018-2020	1 June 2017

Document number	Description	Date
BoR (17) 168	International Roaming BEREC Benchmark Data Report October 2016-March 2017	5 October 2017
BoR (17) 169	BEREC Report Regulatory Accounting in Practice 2017	5 October 2017
BoR (17) 170	Report on BEREC International Mission to India	5 October 2017
BoR (17) 174	BEREC Report on the outcome of the consultation on the Draft BEREC Medium Term Strategy for 2018-2020	5 October 2017
BoR (17) 177	BEREC Report on the outcome of the consultation on the Draft Net Neutrality Regulatory Assessment Methodology	5 October 2017
BoR (17) 179	Net Neutrality Measurement Tool Specification	5 October 2017
BoR (17) 182	BEREC Report on the new forms of sharing passive optical networks based on wavelength division multiplexing	5 October 2017
BoR (17) 183	BEREC Report of the public consultation on BEREC Report on IP interconnection practices in the context of net neutrality	5 October 2017
BoR (17) 184	BEREC Report on IP interconnection practices in the context of net neutrality	5 October 2017
BoR (17) 187	BEREC Report on the convergence of fixed and mobile networks	6 October 2017

Document number	Description	Date
BoR (17) 227	Termination rates at European level July 2017	7 December 2017
BoR (17) 230	BEREC Report on transparency and comparability of international roaming tariffs	7 December 2017
BoR (17) 237	BEREC Report on the outcome of the public consultation on the draft Work Programme for 2018	7 December 2017
BoR (17) 240	BEREC Report on the implementation of Regulation (EU) 2015/2120 and BEREC Net Neutrality Guidelines	7 December 2017
BoR (17) 241	BEREC Report on tools and methods used to identify commercial and technical practices for the implementation of Article 3 of Regulation 2015/2120	7 December 2017
BoR (17) 243	Report on non-residential market indicators for the European Commission's Digital Scoreboard	8 December 2017
BoR (17) 245	BEREC Report on the implementation of the Broadband Cost Reduction Directive	7 December 2017
BoR (17) 246	BEREC Analysis of individual NRAs' roles around access conditions to State aid-funded infrastructure	7 December 2017
BoR (17) 256	BEREC and RSPG joint report on facilitating mobile connectivity in 'challenge areas'	22 December 2017
BoR (17) 257	BEREC Report on the outcome of the consultation on the draft BEREC–RSPG joint report on facilitating mobile connectivity in 'challenge areas'	22 December 2017

C. Board of Regulators (BoR) Decisions

Document number	Description	Date
BoR/2017/01	Decision of the BoR on the appointment of the Market and Economic Analysis Expert Working Group Co-Chair	23 February 2017
BoR/2017/02	Decision on the BEREC Article 7 and 7a Phase II Pool of Rapporteurs to be contacted when no Rapporteur is identified within 24 hours after Office's consultation with NRAs' focal points	2 June 2017
BoR/2017/03	Decision of the Board of Regulators on the adoption of the draft BEREC Visual Identity Guidelines	21 July 2017
BoR/2017/04	Decision of the Board of Regulators on confirmatory application for access to BEREC Documents of BoR (16) 164 – Overview of the regulatory treatments of termination rates for voice calls originated outside the EEA and their impacts on cross-border traffic and settlements and BoR (16) 45 – PRD on regulatory treatment of termination rate for voice calls originated outside the EEA	3 August 2017
BoR/2017/05	Decision of the Board of Regulators on the approval of publication on the Public Register of the BEREC Document of BoR (15) 77	24 July 2017
BoR/2017/06	Decision of the Board of Regulators on the appointment of the End-User Expert Working Group Co-Chair	2 November 2017
BoR/2017/07	Decision of the Board of Regulators on the BEREC Expert Working Groups	7 December 2017

D. Documents approved for public consultation

Document number	Description	Date
BoR (17) 38	Stakeholder consultation on the review of the BEREC Medium-Term Strategy for 2018-2020	23 February 2017
BoR (17) 109	Draft BEREC Strategy 2018-2020	2 June 2017
BoR (17) 111	Draft BEREC Report on IP interconnection practices in the context of net neutrality	1 June 2017
BoR (17) 112	Draft Net Neutrality Regulatory Assessment Methodology	1 June 2017
BoR (17) 176	Draft BEREC Work Programme 2018	5 October 2017
BoR (17) 181	Draft BEREC Report on the impact of premium content on ECS markets and effect of devices on the openness of the internet use	5 October 2017
BoR (17) 185	Draft BEREC and RSPG joint report on facilitating mobile connectivity in 'challenge areas'	31 October 2017
BoR (17) 186	Draft BEREC Preliminary report in view of a Common Position on monitoring mobile coverage	5 October 2017

E. Annual work programme and annual reports

Document number	Description	Date
BoR (17) 108	BEREC Annual Reports 2016	1 June 2017
BoR (17) 238	BEREC Work Programme 2018	7 December 2017

F. Regulatory best practices

Document number	Description	Date
BoR (17) 56	BEREC Guidelines on Regulation (EU) No 531/2012, as amended by Regulation (EU) 2015/2120 and Commission Implementing Regulation (EU) 2016/2286 (Retail Roaming Guidelines)	27 March 2017
BoR (17) 114	BEREC Guidelines on Regulation (EU) No 531/2012, as amended by Regulation (EU) 2015/2120 and by Regulation (EU) 2017/920 (Wholesale Roaming Guidelines)	9 June 2017
BoR (17) 178	BEREC Net Neutrality Regulatory Assessment Methodology	5 October 2017

G. Other documents

Document number	Description	Date
BoR (17) 41	BEREC update survey on the implementation and application of the universal service provisions – A synthesis of the results	24 February 2017
BoR (17) 131	BEREC-EMERG-EaPeReg-REGULATEL Summit declaration	31 May 2017
BoR (17) 159	Study on net neutrality regulation	19 September 2017
BoR (17) 194	BEREC High-level statement on the need for a minimum set of competences for independent NRAs in the European Electronic Communications Code	5 October 2017
BoR (17) 228	5th BEREC Stakeholder Forum – Summary of proceedings	7 December 2017

Annex 10 Electronic voting procedures of the Board of Regulators (BoR)

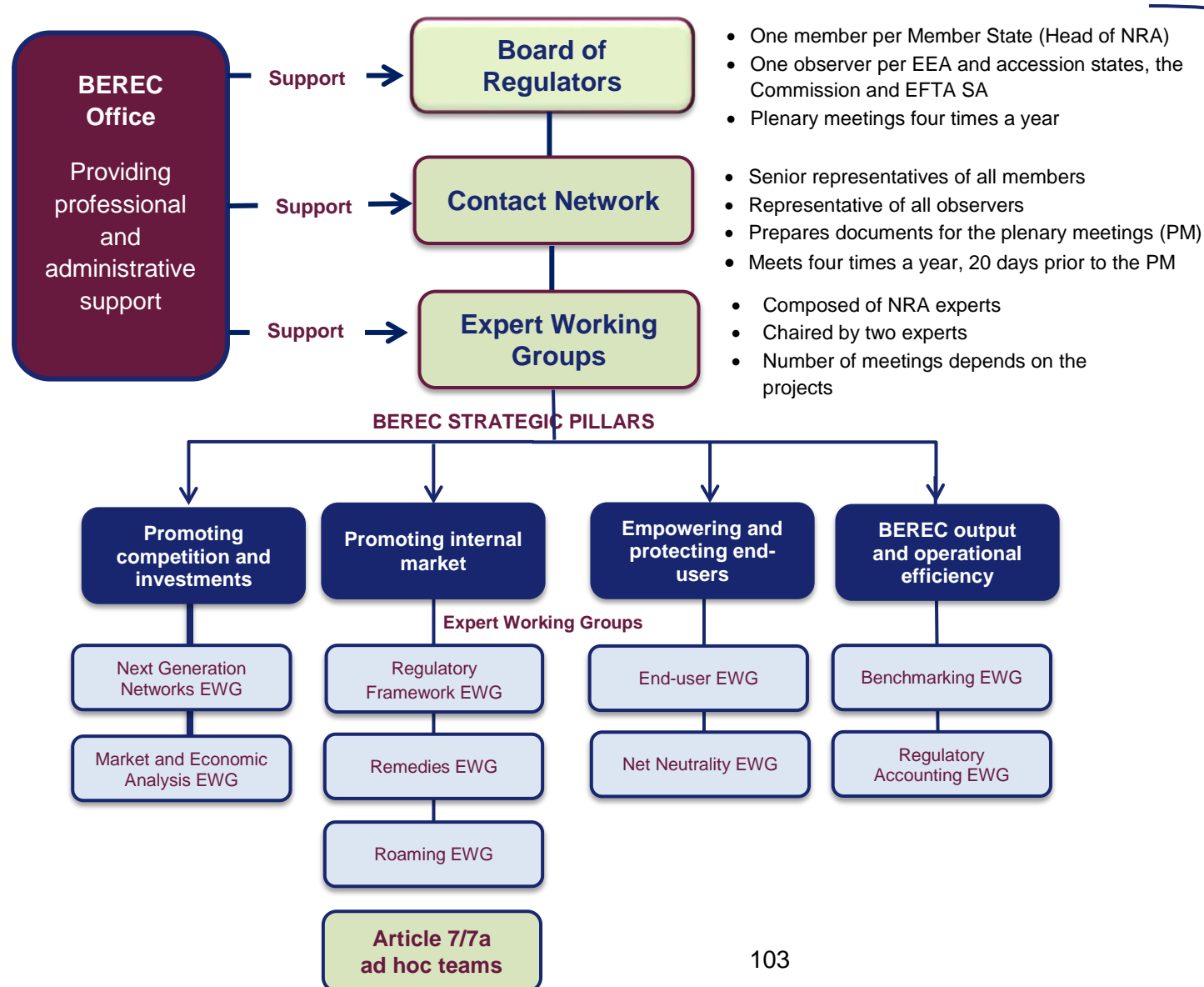
No	Subject	Comments round		Voting round	
		Start/link to documents	End	Start/link to documents	End/link to record
1	BEREC Opinion on Article 7/7a Phase II: Case NL/2017/1960	02.03.2017	06.03.2017	08.03.2017	09.03.2017
2	BEREC Guidelines on Regulation (EU) No 531/2012, as amended by Regulation (EU) 2015/2120 and Commission Implementing Regulation (EU) 2016/2286 (Retail Roaming Guidelines)	21.03.2017	23.03.2017	24.03.2017	27.03.2017
3	1) BEREC views on the draft report elaborated by ITRE Rapporteur Evžen Tošenovský on the proposal for a regulation of the European Parliament and of the Council establishing the Body of European Regulators for Electronic Communications 2) BEREC views on duration, on renewal of rights and on coordinated timing of assignments 3) BEREC views on non-competitive oligopolies in the Electronic Communications Code	22.03.2017	24.03.2017	27.03.2017	28.03.2017
4	BEREC Opinion on Article 7/7a Phase II: Case DE/2017/1961	29.03.2017	31.03.2017	04.04.2017	05.04.2017
5	1) BEREC views on the double lock veto in the Commission's proposal and ITRE draft Report 4) BEREC views on the market review process in the	21.04.2017	25.04.2017	26.04.2017	27.04.2017

No	Subject	Comments round		Voting round	
		Start/link to documents	End	Start/link to documents	End/link to record
	Commission's proposal and ITRE draft Report 6) Ensuring continued NRA powers to impose symmetric access obligations 10) BEREC paper on the Commission's proposals for an EECC Spectrum Provisions – Implementing Acts				
6	BEREC views on: 2) step-back of regulation 3) co-investment5) wholesale-only model 7) notification regime 8) data collection from OTTs	03.05.2017	08.05.2017	09.05.2017	10.05.2017
7	BEREC views on Paper 9 – Peer review process (Article 35)	04.05.2017	09.05.2017	09.05.2017	10.05.2017
8	Updated BEREC views on Paper 9 – Peer review process (Article 35)	24.05.2017	26.05.2017	29.05.2017	30.05.2017
9	Access to BEREC document on Indicators on Bundles	29.06.2017	06.07.2017	13.07.2017	20.07.2017

No	Subject	Comments round		Voting round	
		Start/link to documents	End	Start/link to documents	End/link to record
10	BEREC Visual Identity Guidelines	29.06.2017	06.07.2017	13.07.2017	20.07.2017
11	Decision of the Board of Regulators on confirmatory application for access to BEREC Documents of BoR (16) 164 – Overview of the regulatory treatments of termination rates for voice calls originated outside the EEA and their impacts on cross-border traffic and settlements and BoR (16) 45 – PRD on regulatory treatment of termination rate for voice calls originated outside the EEA	24.07.2017	27.07.2017	31.07.2017	03.08.2017
12	BEREC Opinion on Article 7/7a Phase II: Case DE/2017/1997	10.08.2017	14.08.2017	16.08.2017	17.08.2017
13	Publication of the BEREC Study on net neutrality regulation	30.08.2017	06.09.2017	08.09.2017	15.09.2017

No	Subject	Comments round		Voting round	
		Start/link to documents	End	Start/link to documents	End/link to record
14	Decision of the Board of Regulators on the appointment of the End-User Expert Working Group Co-Chair	13.10.2017	20.10.2017	25.10.2017	02.11.2017
15	Two BEREC inputs on Telecommunication Regulatory Framework review: 1) universal service 2) general authorisation	16.10.2017	20.10.2017	23.10.2017	24.10.2017
16	BEREC Opinion on Article 7/7a Phase II: Case SK/2017/2010	28.11.2017	30.11.2017	04.12.2017	05.12.2017
17	BEREC Opinion on Article 7/7a Phase II: Case AT/2017/2020	04.12.2017	06.12.2017	08.12.2017	11.12.2017
18	BEREC–RSPG Report on facilitating mobile connectivity in ‘challenge areas’ BEREC Report on the outcomes of the public consultation on draft BEREC–RSPG Report on facilitating mobile connectivity in ‘challenge areas’	07.12.2017	14.12.2017	15.12.2017	22.12.2017

Annex 11 BEREC's organisational structure

**ADVICE TO**

- European Commission
- European Parliament
- Council of the EU

OUTCOMES

- Strategies
- Work Programmes
- Reports/Snapshots
- Opinions
- Advices
- Common positions/approaches
 - Guidelines
 - Common positions/approaches
 - Methodologies
- Decisions
- Workshops

INTERACTION WITH THE PUBLIC

- Public consultations
- Public hearings
- Stakeholder Forum
- Public debriefings

Annex 12 List of the members and observers of the Board of Regulators established pursuant to Article 4 (1) of Regulation (EC) No 1211/2009 of the European Parliament and of the Council of 25 November 2009 establishing the Body of European Regulators for Electronic Communications (BEREC) and the Office

No	Country (if applicable)	Title	Name(s)	Surname(s)	Name of organisation	Member or observer
1	Albania	Mr	Piro	Xhixho	Electronic and Postal Communications Authority of Albania (AKEP)	Observer
2	Austria	Mr	Johannes	Gungl	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	Veselin	Bozhkov	Communications Regulation Commission (CRC)	Member
5	Croatia	Mr	Dražen	Lučić	Croatian Regulatory Authority for Network Industries (HAKOM)	Member
6	Cyprus	Mr	George	Michaelides	Office of the Commissioner of Telecommunications and Postal Regulation (OCECPR)	Member

No	Country (if applicable)	Title	Name(s)	Surname(s)	Name of organisation	Member or observer
7	Czech Republic	Mr	Jaromír	Novák	Czech Telecommunication Office (CTU)	Member
8	Denmark	Mrs	Katrine	Windning	Danish Business Authority (DBA)	Member
9	Estonia	Mr	Kaur	Kajak	Estonian Technical Regulatory Authority (ETRA)	Member
10	Finland	Mrs	Kirsi	Karlamaa	Finnish Communications Regulatory Authority (FICORA)	Member
11	Former Yugoslav Republic of Macedonia	Mr	Sasho	Dimitrijoski	Agency for Electronic Communications (AEC)	Observer
12	France	Mr	Sébastien	Soriano	Autorité de Régulation des Communications électroniques et des Postes (ARCEP)	Member
13	Germany	Mr	Wilhelm	Eschweiler	Federal Network Agency (BNetzA)	Member
14	Greece	Mr	Dimitrios	Tsamakis	Hellenic Telecommunications and Post Commission (EETT)	Member

No	Country (if applicable)	Title	Name(s)	Surname(s)	Name of organisation	Member or observer
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	Latvia	Mr	Rolands	Irklis	Public Utilities Commission (SPRK)	Member
20	Liechtenstein	Mr	Kurt	Buehler	Office for Communications/Amt für Kommunikation (AK)	Observer
21	Lithuania	Mr	Feliksas	Dobrovolskis	Communications Regulatory Authority (RRT)	Member
22	Luxembourg	Mr	Luc	Tapella	Institut Luxembourgeois de Régulation (ILR)	Member

No	Country (if applicable)	Title	Name(s)	Surname(s)	Name of organisation	Member or observer
23	Malta	Mr	Edward	Woods	Malta Communications Authority (MCA)	Member
24	Montenegro	Mr	Darko	Grgurovic	Montenegro Agency for Electronic Communications and Postal Services (EKIP)	Observer
25	Norway	Mrs	Elisabeth	Sørbøe Aarsæther	Norwegian Communications Authority (Nkom)	Observer
26	Poland	Mr	Marcin	Cichy	Office of Electronic Communications (UKE)	Member
27	Portugal	Mr	Joao Antonio	Cadete de Matos	Autoridade Nacional de Comunicações (ANACOM)	Member
28	Romania	Mr	Sorin Mihai	Grindeanu	National Authority for Management and Regulation in Communications (ANCOM)	Member
29	Serbia	Mr	Vladica	Tintor	Regulatory Agency for Electronic Communications and Postal Services (RATEL)	Observer

No	Country (if applicable)	Title	Name(s)	Surname(s)	Name of organisation	Member or observer
30	Slovakia	Mr	Vladimír	Kešjar	Regulatory Authority for Electronic Communications and Postal Services (RÚ)	Member
31	Slovenia	Mrs	Tanja	Muha	Agency for Communication Networks and Services of the Republic of Slovenia (AKOS)	Member
32	Spain	Mrs	Alejandra	De Iturriaga Gandini	Comisión Nacional de los Mercados y la Competencia (CNMC)	Member
33	Sweden	Mr	Dan	Sjoblom	National Post & Telecommunications Agency (PTS)	Member
34	Switzerland	Mr	Stephan	Netzle	Federal Communications Commission (COMCOM)	Observer
35	Netherlands	Mr	Henk	Don	Authority for Consumers and Markets (ACM)	Member
36	Turkey	Mr	Ömer Fatih	Sayan	Information and Communication Technologies Authority (ICTA)	Observer

No	Country (if applicable)	Title	Name(s)	Surname(s)	Name of organisation	Member or observer
37	United Kingdom	Mr	Stephen	Unger	Office of Communications (OFCOM)	Member
38		Mr	Roberto	Viola	European Commission (EC)	Observer
39		Mr	Gunnar Thor	Pétursson	EFTA Surveillance Authority (ESA)	Observer

List of acronyms

ACM - Authority for Consumers and Markets (Netherlands)

AEC - Agency for Electronic Communications (the former Yugoslav Republic of Macedonia)

AGCOM - Autorità per le Garanzie nelle Comunicazioni (Italy)

AK - Office for Communications / Amt für Kommunikation (Liechtenstein)

AKEP - Electronic and Postal Communications Authority of Albania

AKOS - Agency for Communication Networks and Services of the Republic of Slovenia

ANACOM - Autoridade Nacional de Comunicações (Portugal)

ANCOM - National Authority for Management and Regulation in Communications (Romania)

ARCEP - Autorité de Régulation des Communications électroniques et des Postes (France)

ARRPU - Average Retail (mobile) Revenue Per User

BCRD Broadband Cost Reduction Directive

BEREC - Body of European Regulators for Electronic Communications

BEUC - Bureau Européen des Unions de Consommateurs

BIPT/IBPT - Belgian Institute for Postal Services and Telecommunications

BNETZA - Bundesnetzagentur (National regulator, Germany)

BT - British Telecom

BU-LRIC - Bottom-Up Long-Run Incremental Costs

CAGR - Compound Annual Growth Rate

CAP - Capital-Asset Pricing

CAP-M - Capital-Asset Pricing Model

CDN - Content Delivery Network

CEO - Chief Executive Officer

CES - Consumer Technology Association

CN - Contact Network

CNMC - Comisión Nacional de los Mercados y la Competencia (Spain)

COCOM - Communications Committee, European Union

COMCOM - Federal Communications Commission (Switzerland)

COMREG - Commission for Communications Regulation (Republic of Ireland)

COUNCIL - Council of the European Union

CRC - Communications Regulation Commission (Bulgaria)

CTU - Czech Telecommunication Office

DBA - Danish Business Authority

DE - Germany

DG - Directorate General

DSB - Dispute Settlement Body

DSL - Digital Subscriber Line

DT - Deutsche Telekom

EC - European Commission

ECS - Electronic Communications Service(s)/Sector

ECTA - European Communities Trade Mark Association

EEA - European Economic Area

EECC - European Electronic Communications Code

EETT - Hellenic Telecommunications and Post Commission (Greece)

EFTA - European Free Trade Association

EIF - European Internet Forum

EKIP - Montenegro Agency for Electronic Communications and Postal Services

EMERG - Euro-Mediterranean Regulators Group

ENISA - European Union Agency for Network and Information Security

EP - European Parliament

ESA - EFTA Supervisory Authorities

ETNO - European Telecommunications Network Operators' Association

ETRA - Estonian Technical Regulatory Authority

EU - European Union

EUR - European currency (EURO)

EWG - Expert Working Group

FCC - Federal Communications Commission (United States of America)

FDC - Fully-Distributed Costs

FI - Finland

FICORA - Finnish Communications Regulatory Authority

FTR - Fixed Termination Rate

FTTB - Fibre-To-The-Building

FTTH - Fibre-To-The-Home

FULL - Full Unbundled Local Loop

FUP - Fair Use Policy (in relation to roaming)

GB - Gigabyte

GDP - Gross Domestic Product

GSMA - Global System for Mobile Communications Association

HAKOM - Croatian Regulatory Authority for Network Industries

HICP - Harmonised Index of Consumer Prices

IAS - Internet Access Services

IBPT/BIPT - Belgian Institute for Postal Services and Telecommunications

ICTA - Information and Communication Technologies Authority (Turkey)

IDATE - European Digital Economy Think-tank

IETF - Internet Engineering Task Force

ILR - Institut Luxembourgeois de Régulation (Luxembourg)

IMCO - Committee on Internal Market and Consumer Protection

IP - Internet Protocol

IR - International roaming (EU)

IRG - Independent Regulators Group

ITRE - European Parliamentary Committee on Industry, Research and Energy

ITU - International Telecommunication Union

LLU - Local Loop Unbundling

LMAP - Large-Scale Measurement of Broadband Performance

LRAIC - Long Run (Average) Incremental Costs

LRIC - Long Run Incremental Costs

MB - Megabyte

MCA - Malta Communications Authority

MEP - Members of the European Parliament

MMS - Multimedia Messaging Service

MNO - Mobile Network Operator

MTR - Mobile Termination Rate

NFV - Network Functions Virtualisation

NGA - Next Generation Access

NL - The Netherlands

NMHH - National Media and Infocommunications Authority (Hungary)

NN - Net Neutrality

NRA - National Regulatory Authority

OCECPR - Office of the Commissioner of Telecommunications and Postal Regulation (Cyprus)

OECD - Organisation for Economic Co-operation and Development

OFCOM - Office of Communications (United Kingdom)

ONS - Eurostat, Office for National Statistics

OS - Operating System(s)

OTT - Over-the-Top

PEER - Partnership for the Enforcement of European Rights

PON - Passive Optical Network

PRD - Project Requirements Document

PT - Portugal

PTA - Post and Telecom Administration (Iceland)

PTS - National Post & Telecommunications Agency (Sweden)

RATEL - Regulatory Agency for Electronic Communications and Postal Services (Serbia)

REGULATEL - Latin American Forum of Telecommunications Regulators

RLAH - Roam Like At Home

RO - Romania

RRT - Communications Regulatory Authority (Lithuania)

RSPG - Radio Spectrum Policy Group

RTR - Austrian Regulatory Authority for Broadcasting and Telecommunications

SA - Surveillance Authority

SDN - Software-Defined Networking

SIP - Single Information Point

SK - Slovakia

SLU - Sub-Loop Unbundling

SMP - Significant Market Power

SMS - Short Message Service

SPRK - Public Utilities Commission (Republic of Latvia)

STOXX - STOXX Europe 600 Index

TCPI - Technical and Commercial Practices Investigation

TR - Termination Rate

TRAI - Telecom Regulatory Authority of India

TRR - Termination Rates Recommendation

TSM - Telecom Single Market

TV - Television

UKE - Office of Electronic Communications (Poland)

ULL - Unbundled Local Loop

US - United States (of America)

USA - United States of America

USD - Universal Service Directive

USO - Universal Service Obligation

VAT - Value Added Tax

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

VHC - Very High Capacity

VULA - Virtual Unbundled Local Access

WACC - Weighted Average Cost of Capital

WP - Work Programme

WU - Wavelength Unbundling