



BEREC Annual Reports – 2016

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FOREWORD BY THE BEREC CHAIR FOR 2016

In my capacity as BEREC Chair for 2016, I am pleased to present BEREC's Annual Reports 2016. As in previous years, the first report (part A) is dealing with BEREC's work and achievements in light of the BEREC Work Programme 2016, whereas the second one (part B) is dealing with developments in the electronic communications sector in 2016.

BEREC highlights in 2016

Two major projects have been making this year an extremely exciting and challenging one for BEREC: Net Neutrality and International Roaming. Furthermore, the Review of the telecommunications framework started as the third major project.

First of all, BEREC had been tasked to develop guidelines for national regulatory authorities on the implementation of the new European Net Neutrality rules ensuring an open Internet. In an unprecedented public consultation of the draft guidelines, BEREC has received over 481,000 contributions from the civil society, public institutions, independent experts, providers and other stakeholders. This extensive feedback shows the importance of this issue and that BEREC's role was highly appreciated. BEREC conducted an intensive analysis and evaluation of the contributions and updated its draft accordingly. This resulted in an outcome which BEREC can be proud of: Our final guidelines are contributing to the consistent application of Net Neutrality regulation across Europe providing guidance when implementing the rules and assessing specific cases.

Secondly, BEREC has been mandated with various tasks in the area of International Roaming. BEREC has provided expertise and delivered its substantiated analysis on the Implementing Act to the European Commission on time. In addition to that, BEREC started to revise the relevant BEREC Guidelines to give stakeholders and NRAs guidance with a view to the implementation of the rules of the Regulation and thereby to ensure a successful implementation of the roam like at home regime across Europe.

Besides these two projects, another ongoing major project – not limited to 2016 – has for sure decisively shaped the BEREC activities this year: the Review of the framework for electronic communications. At the end of 2016, BEREC has delivered a first opinion with high level messages evaluating the measures proposed from the regulatory perspective. It focuses on three important aspects of the European Commission's proposals: the scope of the framework, access regulation and the institutional set-up. Let me briefly reiterate the key messages that we have adopted. First of all, BEREC welcomes the inclusion of a range of "over the top" (OTT) services in the scope of the legal framework. Secondly, we have raised some concerns regarding the operation of some of the proposed provisions which risk undermining competition and constrain the ability of NRAs to respond to differences in market conditions. Thirdly, yes there is scope for BEREC to improve its efficiency but this does not require a change to the current institutional balance that has delivered successfully over the last years. Therefore we object to the proposed transformation of BEREC into a decentralized EU Agency as well as the extension of veto powers for the European Commission (double lock veto).

Further BEREC output following its Work Programme

The following list provides some further highlights and outputs from our activities in 2016, following the strategic priorities – promoting competition and investment, promoting the internal market, empowering and protecting end-users, and quality and efficiency – which were laid down in BEREC's Work Programme:

- BEREC Input paper on Potential Regulatory Implications of Software-Defined Networking and Network Functions Virtualisation, following a public expert workshop on the regulatory implications of SDN and NFV; BEREC Report Enabling the Internet of Things;
- BEREC Report on Case Studies on Migration from POTS/ISDN to IP on the Subscriber Access Line in Europe;
- Common Position on Layer 2 Wholesale Access Products;
- BEREC Report on the Wholesale Roaming Market;
- BEREC Response to the European Commission's Public Consultation on the Evaluation of the Termination Rates Recommendation;
- BEREC Workshop on the Accessibility of Communications Services;
- two BEREC Reports on Termination Rates at European Level (January and July 2016);
- several Roaming Data Reports;
- BEREC Report Regulatory Accounting in Practice 2016.

Liaison with European institutions

As in previous years, BEREC has ensured a continuous engagement with the European Commission, the Council and the European Parliament providing input at frequent intervals based on its regulatory expertise to all the EU-institutions.

Let me in particular mention here several meetings with the European Commission on various topics around the Telecoms Review proposals. BEREC was also able to provide its expert opinion and advice to the European Parliament with a view to the TSM deliverables on Net Neutrality and International Roaming as well as on the Telecoms Review proposals, the latter in an ITRE hearing. Additionally worthwhile to mention are the two BEREC-European Parliament lunch meetings in 2016 discussing various Telecoms Review topics in some more detail. BEREC also was invited to discuss with the Council Working Party on the TSM follow-up as well as on the Telecoms Review proposals- for example, with a view to connectivity, spectrum and institutional design.

Article 7/7a procedures

Also in 2016, BEREC proved that it is highly reliable and competent in fulfilling its tasks foreseen by the regulatory framework. In the context of the procedures according to Article 7/7a of the Framework Directive, BEREC was assigned the task of delivering an Opinion in cases in which the European Commission considers a national regulatory measure to hinder the successful development of the Single European Market for electronic communications.

In four cases, BEREC was asked to deliver an Opinion. Within tight timeframes, the national experts forming the ad-hoc working groups analysed the concerned draft measures. In all cases, the Opinions generally shared the Commission's serious doubts while sometimes also supporting certain aspects of the NRAs' draft measures. The functioning of this procedure shows that the approach set up in the current regulatory framework, with the high-quality and timely support of BEREC, leads to an increased harmonization in national regulatory decision. Again, BEREC has demonstrated that it is fully capable of reacting quickly without neglecting the analytic thoroughness needed to fulfil its duties.

Looking back, I would like to express my sincere gratitude to all NRAs and their experts for their continued commitment in 2016. In particular I would also like to thank the EWG Co-Chairs on which the Board of Regulators relies heavily. It cannot be overestimated what we have rightly pointed out in various BEREC opinions: BEREC's strength lies in its rootedness in its constituent members, the NRAs.

Furthermore, I would like to thank the staff of the BEREC Office in Riga for its professional support and for the excellent cooperation throughout the year. Similarly, the support of the BEREC Vice-Chairs of 2016 should be mentioned, who helped making 2016 a very successful and fruitful year for BEREC.

Looking ahead, I would like to express all my best wishes to my successor Sébastien Soriano as BEREC Chair 2017.

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1. Introduction

The aim of this report is to present briefly the activities of BEREC in 2016, in accordance with Article 5(5) of the BEREC Regulation.

As usual, the annual report on BEREC's activities in 2016 is based on the work streams and priorities that were laid out in the BEREC Work Programme 2016 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 2016 and a list of the documents produced within each work stream. Article 7/7a cases are presented in a similar manner.

2. Work Programme 2016

2.1 Promoting competition and investment

2.1.1 Potential regulatory implications of Network Functions Virtualisation (NFV) and Software-Defined Networking (SDN)

In June 2016, BEREC published the “Input paper on Potential Regulatory Implications of Software-Defined Networking (SDN) and Network Functions Virtualisation (NFV)”. This was a response of the hard work of the electronic communications and IT sectors on these two new fundamental technological developments which aim to transform the way in which network operators design and operate networks. To help national regulatory authorities (NRAs) cope appropriately with the possible related regulatory challenges and in response to the European Commission’s request for a BEREC opinion on the review of the regulatory framework with regard to SDN and NFV, the input paper’s objectives were:

1. to identify potential regulatory implications of SDN and NFV;
2. to respond to the Commission’s questions and identify how the regulatory framework should be adapted.

As part of this project BEREC also held a public expert workshop on the regulatory implications of SDN and NFV on 21 January 2016 in Brussels. SDN and NFV experts were invited to present their views on the impact these technological developments will have on regulation. The outcomes helped BEREC to draft its opinion on the review of the regulatory framework in this regard.

SDN is a new architecture where network control is logically centralised (decoupling of control and data planes) and directly programmable, and the underlying network infrastructure is abstracted from the applications. NFV transforms network architectures by evolving standard IT virtualisation technology to consolidate a large and increasing variety of purpose-built hardware appliances used on today’s networks onto industry-standard high-volume servers, storage and switches and it implements network functions in software. SDN and NFV are highly complementary and ultimately will become less distinguishable as independent topics, instead being subsumed into a unified software-based networking paradigm.

SDN and NFV are still in the early days of development and deployment and are far from realising their full potential. It is currently unclear whether and to what extent this potential will ever be realised.

The document analyses the following regulatory impacts of SDN and NFV:

Access to passive network infrastructure: in networks based on SDN and NFV, passive network infrastructure is used in the same way as in the networks of today. Therefore, SDN and NFV do not have any impact on the access to passive network infrastructure.

Fixed network access: SDN and NFV have the potential to enable new forms of fixed network access which provide alternative network operators with more control over the network of the incumbent compared to current Layer 2 wholesale access products (e.g. VULA). It remains to be seen whether SDN and NFV will be developed further in order to enable such new forms of fixed network access.

Mobile virtual networks and sharing of network elements: SDN and NFV have the potential to enable new forms of mobile virtual networks and sharing of network elements (e.g. mobile

base stations). Whether this happens and what new forms of mobile network sharing and sharing of network elements will actually be enabled by SDN and NFV will become clear from the further development of SDN and NFV.

Calculation of network costs: the benefits of networks based on SDN and NFV are reduced network equipment costs and operational costs. Therefore, in the future it may be necessary to update the models used for the calculation of network costs.

Current value chains: SDN and NFV enable new types of services and have the potential to change current value chains. However, it is too early to determine the impact that the changes of the value chains will have on the consumer, industry, regulation and the networking ecosystem.

This analysis and the current state of development of SDN and NFV lead to the following conclusions.

- The new regulatory framework must be flexible enough to cope with the dynamic development of SDN and NFV and its uncertain outcome.
- The new regulatory framework must enable NRAs to respond appropriately to the dynamic development of SDN and NFV.

Document:

BoR (16) 97 – BEREC Input paper on Potential Regulatory Implications of Software-Defined Networking and Network Functions Virtualisation

2.1.2 Enabling the Internet of Things

This report gives BEREC's assessment of the state of play on IoT services from a perspective of fostering an environment that will result in sustainable competition, interoperability of electronic communications services (ECS) and consumer benefits. The report presents the most common characteristics of IoT services and, with regard to current and potential future regulatory issues, assesses whether IoT services might require special treatment. Some suggestions are made for NRAs about how they might deal with these issues.

The scope of this report, the detailed topics contained therein and suggestions for how areas of work may be taken forward are all partly constrained by the specific responsibilities that fall to the NRAs. Consequently, the report deals only to a certain extent with issues such as privacy and standardisation which, depending on the country, are not or not fully within the NRAs' remit.

For IoT services to thrive several preconditions need to be fulfilled which relevant authorities (NRAs, European Commission, other authorities, Member States, etc.) might help to establish and which are set out in the report. The following are needed:

1. sufficient resources (spectrum, numbers, IP addresses and other identifiers) in order to underpin and support the service (cf. section 2);
2. an EU telecommunications framework suited to IoT services (cf. section 3);
3. consumers' acceptance of IoT services, which depends, among other things, on the information provided to them about the level of privacy, network and data security and

interoperability of services, devices and platforms (cf. section 4 on privacy and standardisation and section 3.4 on network security).

A range of technology options are likely to be used to deploy IoT services. Since the IoT market is at a different stage of development across the EU, NRAs should monitor market developments and spectrum use. For harmonisation purposes, the industry is invited to make use of the established processes via ETSI and CEPT if it identifies the demand for additional spectrum. Based on these harmonised European standards and frequencies, NRAs are invited, where appropriate, to make spectrum available to support these applications.

BEREC considers that the use of existing numbering resources, the extraterritorial use of numbers and the use of ITU numbers seems to be a reasonable approach. In the short and medium term – and perhaps even in the long term – traditional telecommunications numbers (E.164 and E.212) will continue to be one way of identifying IoT devices. In the longer term, the use of IPv6 addresses might become the preferred solution. No need for a European numbering scheme for M2M communication has been identified.

Under the present regulatory framework, the connectivity service provider who provides connectivity over a public network for remuneration is generally the provider of an ECS in the IoT value chain while the IoT user (e.g. car manufacturer, provider of energy including smart meter) typically does not provide an ECS. Overall, since there are so many different types of packages that include connectivity and since business models are just beginning to develop, NRAs need to assess carefully the situations in which an IoT user may – or may not – be qualified as a provider of an ECS.

Within the ongoing review and DSM process there needs to be an assessment of whether and to what extent the existing rules (which were primarily construed for voice telephony) also fit to machine-to-machine (M2M) communications or not.

In view of the Digital Single Market (DSM) review, BEREC considers that, in general, no special treatment of IoT services and/or M2M communication is necessary, except for the following areas:

1. roaming
2. switching
3. number portability.

With regard to privacy, BEREC sees the need for careful evolution – but not an entire overhaul – of the existing EU data protection rules.

Nonetheless, within the DSM review, further areas for amendments of the regulatory framework might be identified, taking into account the peculiarities of IoT services and/or M2M communication.

Documents:

BoR (16) 38 – BEREC Report on the Public Consultation of the Report Enabling the Internet of Things

BoR (16) 39 – BEREC Report Enabling the Internet of Things

2.1.3 Migration to all-IP in the access network

In October 2016, BEREC published 'Case Studies on Migration from POTS/ISDN to IP on the Subscriber Access Line in Europe', as a response to the increasing number of operators (fixed and mobile) in EU Member States which are migrating their networks to next-generation networks or all-IP networks. When fixed networks are migrated to NGN/all-IP networks, the access network also needs to be migrated to IP. Network operators can either migrate the technology used on the subscriber access line (SAL) from POTS/ISDN to IP (VoIP-based SAL) or continue to use POTS/ISDN on the SAL and convert between POTS/ISDN and IP in the multi-service access node (MSAN). The focus of this report is on migration to VoIP-based SAL since this type of migration may have more impact on subscribers and may need more regulatory intervention compared to conversion to IP in the MSAN.

In order to get a deeper insight into the migration to VoIP-based SAL and to foster the exchange of experiences between NRA this report's objectives were to give an overview of:

1. the migration to VoIP-based SAL in Europe on a general level based on information from 31 European countries;
2. the migration to VoIP-based SAL in the network of the incumbent which has already taken place (at least to some extent) based on the experiences of ten countries (Croatia, Germany, Italy, Luxembourg, Montenegro, Netherlands, Slovakia, Slovenia, Spain and Switzerland).

The high-level analysis of the status of migration to VoIP-based SAL in Europe shows that in seven countries the incumbent has already finished the migration to an NGN/all-IP network, in 16 countries this migration is still ongoing and in eight countries this migration has not yet begun. Of the 23 countries in which the incumbent is migrating its network to an NGN/all-IP network, or has already finished this migration, traditional copper-based SAL are being migrated to VoIP copper-based SAL in 16 countries and to VoIP fibre-based SAL in 19 countries. The migration to VoIP on copper-based SAL is network driven, i.e. forced by the incumbent in 12 countries and customer driven, i.e. initiated by the customers in six countries.

The document analyses the migration to VoIP-based SAL in the network of the incumbent in the ten countries considered with regard to

1. the migration strategy used;
2. issues during the migration phase to VoIP-based SAL;
3. impact of the migration to VoIP-based SAL on the voice services for the end users;
4. acceptance of modem and power outlet;
5. impact of the migration to VoIP-based SAL on WLR;
6. impact of the migration to VoIP-based SAL on CS/CPS.

Overall, the impact of the migration to VoIP-based SAL was limited in most of the countries considered as was the need for regulatory intervention. Consumer issues were more likely to arise where the migration was network driven. Wholesale services which are no longer available after migration such as WLR and CS/CPS have been replaced by other (already available) wholesale products such as bitstream access.

Document:

BoR (16) 163 – BEREC Report on Case Studies on Migration from POTS/ISDN to IP on the Subscriber Access Line in Europe'

2.1.4 Current developments in IP interconnection markets and related issues

On 21 November 2016, the third expert workshop on IP-interconnection in co-operation with the OECD was held in Brussels. This was to bring experts from the IP-interconnection community together with experts on interconnection from NRAs and to discuss future IP-interconnection in light of recent market developments and the Regulation (EU) 2015/2120 including rules on net neutrality in the European Union and the FCC's Open Internet Order in the United States of 2015.

The workshop was opened by Henk Don, Member of the Board of ACM and BEREC and Tracey Weisler, Chair of the Working Party for Communication Infrastructures and Services Policy of the OECD and FCC staff member. In Session 1, keynote speaker Bill Woodcock of Packet Clearing House spoke on 'Trends on IP interconnection 2016'. He presented the methodology and results of a 2016 survey on the type of agreement (formal/informal), terms of the agreement, the country of governing law and, for the first time, on IPv6. This was an update of a survey first conducted in 2011.

Session 2 moderated by Cara Schwarz-Schilling of BEREC and BNetzA focused on 'Measuring performance in Internet interconnection'. It began with a more economic perspective on IP interconnection presented by Charlie Vlieland-Boddy of Oxera based on the paper submitted to the Commission consultation on network neutrality. Collin Anderson from Measurement-Lab expanded on M-Lab as an open platform allowing for end-to-end measurement through publicly available data sets around 300 000 measurements/day). Nick Hilliard of the Internet Neutral Exchange Association focused on the impact of last mile issues (mobile or fixed) and consumer-side problems (WiFi insulation, unauthorised usage, etc.) on the end-to-end internet performance and more specifically the performance degradation that users experience. Frederic Gonzales of the Trade and Agriculture Directorate at OECD presented the Services Trade Restrictiveness Index (STRI), an index measuring trade openness including a regulatory database of 44 countries, 22 sectors and 90 000 observations per year for 2014, 2015 and 2016 and links to legislative sources.

Session 3 on industry viewpoints on internet traffic began with a short presentation by Philip Bowie of AT&T. A round-table discussion was moderated by Bill Woodcock of PCH with Sylvie LaPerriere of Google, Philip Bowie of AT&T, Christian Kaufmann of Akamai, Falk von Bornstaedt of Deutsche Telekom, Martin Levy of Cloudflare and Nina Hjorth Bargisen of Netflix. Bill Woodcock asked participants about the establishment of an average interconnection agreement, interconnection regulation, data localisation policies, the development of IPv6 and the rise of multilateral peering agreements.

Session 4 on public authorities' approach to IP interconnection began with a number of presentations: Madeleine Findley, of the FCC (via videoconference) gave an overview of recent FCC activities (e.g. 2015 Open Internet Order). Mario Fromow, Commissioner from the Instituto Federal de las Telecomunicaciones (IFT) presented the status of the telecommunications sector in Mexico before the constitutional reform of 2013, in which the OECD was instrumental. Thibaud Furette of ARCEP covered the work carried out by ARCEP and the French Competition Authority on the topic of IP-interconnection. Eduardo Martinez-Rivero of DG Competition at the European Commission shared the findings from the 2011-2014 competition law investigation into Telefonica, Orange and Deutsche Telekom. This

session was followed by a round-table discussion moderated by Tim Denton of ISOC Canada and Board of ARIN focusing on tools to implement/regulate and the approach of regulators.

The workshop was wrapped up by Sam Paltridge of the OECD and Cara Schwarz-Schilling for BEREC. Mr Paltridge said that in some areas there had been slow progress (e.g. IPv6 uptake) but he had been encouraged by speakers who described changes in this area. He highlighted the fact that these events were very important for the OECD's work. According to Cara Schwarz-Schilling the most important takeaways of the workshop were that developments of IP-interconnection over the past few years seemed to rather reflect evolution than revolution. Most cases relating to IP-interconnection had been dealt by competition law without triggering strict remedies. Monitoring the market and increasing transparency was considered important by many authorities.

Workshop:

3rd BEREC expert workshop on IP-interconnection in co-operation with the OECD, Brussels, 21 November 2016

2.1.5 Challenges and drivers of NGA rollout and infrastructure competition

In October 2016, BEREC published 'Challenges and drivers of NGA rollout and infrastructure competition'. As a starting point, this highlights the fact that high-capacity communication infrastructure is indispensable for economy and society today. In Europe, there is a broad consensus among all parties (the European Commission, national and regional governments, regulatory agencies, communications providers) that the rollout of next generation access (NGA) networks is a desirable and highly important goal. With its 2020 Digital Agenda for Europe, the Commission has set targets for NGA coverage and take-up. European countries have individually defined rollout strategies and are devoting efforts towards the swift rollout of new high-capacity infrastructures.

Although extending NGA coverage is a common objective, the type and speed of NGA rollout varies considerably across European countries. A number of factors are influencing the specific deployment of NGA to a great extent, namely the chosen NGA structure, the technologies deployed and the pace at which rollout takes place.

The report's purpose was to describe this variation in NGA rollout. It provides an overview of where Member States currently stand in terms of NGA rollout and it investigates the main drivers and challenges. The factor analysis is based on a case study approach, drawing on information obtained from NGA stories provided by NRAs. Three important (categories of) driving factors – largely exogenous to the NRAs' sector-specific regulation – are identified and analysed in depth. Infrastructure competition (mostly from DOCSIS 3.0 network upgrades but also from FTTP deployment by alternative operators), demand side factors (i.e. demand for services requiring high bandwidths and a high willingness to pay a premium for NGA-based access) and supply side factors (i.e. factors which influence the costs or the quality of NGA-deployment, including factors which more indirectly influence cost or quality, such as public policy). The analysis shows that in many countries the type of NGA rollout is considerably shaped by the legacy infrastructure and existing civil engineering infrastructure, hence revealing strong elements of path dependency.

This report, in a second step, looks at the different forms of access regulation adopted in different circumstances and different Member States and the possible effects on competition and NGA investments. An important insight from the analysis is that the main factors identified and discussed are factors which are largely or completely beyond regulatory interventions by NRAs. Hence, SMP regulation is only one factor among many and its ability to promote NGA rollout or particular types of NGA rollout should not be overstated. Depending on the external factors identified in the factor analysis, regulatory approaches which best meet the principles of promoting sustainable competition and efficient investment as well as safeguarding consumer benefits might look different across Member States and indeed even within a Member State. Considering four different scenarios, the report shows that SMP regulation focuses on the promotion of competition to incentivise investment taking into account the given national (or subnational) conditions and NGA rollout strategies of operators.

Annex 1 of the report contains a short survey of selected economic literature related to the topics of regulation, competition and NGA rollout. Annex 2 contains the 28 NGA country stories.

Documents:

BoR (16) 170 – BEREC Report on the Public Consultation of the Draft Document ‘Challenges and drivers of NGA rollout and infrastructure competition’

BoR (16) 171 – BEREC Report on Challenges and drivers of NGA rollout and infrastructure competition

2.1.6 Common Position on layer 2 wholesale access products

In October 2016, BEREC published the ‘Common Position on Layer 2 Wholesale Access Products’, which was the response to the increased use of (active) layer 2 (Ethernet) wholesale access products (L2 WAP) as a remedy on the wholesale local access market (market 4/2007, market 3a/2014) or the wholesale broadband access market (market 5/2007, market 3b/2014). In order to get a deeper insight into these products, foster the exchange of experience and contribute to the harmonisation of regulatory instruments used in the European Union, BEREC had already analysed L2 WAP previously and it published the BEREC Report ‘Common characteristics of L2 WAP in the EU’ in 2015 (BoR (15)133).

In this document BEREC goes one step further and defines Common Positions (CPs) for L2 WAP imposed on the wholesale local access market (market 3a) and L2 WAP imposed on the wholesale central access market (market 3b). CPs are defined for the conditions for the imposition of L2 WAP, prices and technical characteristics, contributing to the regulatory objective of enabling alternative operators to provide a variety of competitive services for residential and business customers (including voice, internet, IPTV, data).

The following CPs are defined:

CP1: Conditions for the imposition of L2 WAP on market 3a

CP2: Pricing of L2 WAP

CPs on technical characteristics of L2 WAP imposed on markets 3a or 3b

CP3: Technology

- CP4: CPE/Modem
- CP5: Bandwidth
- CP6: Quality of service
- CP7: Traffic prioritisation
- CP8: Multicast
- CP9: Number of VLANs
- CP10: Customer identification
- CP11: Security
- CP12: Fault management

The technical characteristics of L2 WAP in the CPs can be viewed as minimum requirements. Depending on national circumstances it may be necessary for L2 WAP to fulfil additional requirements (including other technical characteristics).

After approval by the Board of Regulators (BoR), the public consultation ran from 6 June to 1 July 2016. In October, following approval at the BoR 28th plenary meeting, BEREC published the final CP and a report on the results of the public consultation.

Documents:

BoR (16) 161 – BEREC Report on the outcome of the Public Consultation on the draft BEREC Common Position on Layer 2 Wholesale Access Products

BoR (16) 162 – Common Position on Layer 2 Wholesale Access Products

2.1.7 Monitoring implementation of the BEREC revised Common Positions – 3rd phase

In 2012, following a public consultation, BEREC adopted its revised CPs¹, listing the best practice remedies to be implemented in markets 4, 5 and 6².

Having developed a methodology to monitor how NRAs have implemented the revised CPs in 2013 (BoR (13) 108)³, in 2014 BEREC carried out its first (phase 1) monitoring exercise to gain a detailed understanding of which regulatory approaches work best in different national

¹ http://www.berec.europa.eu/eng/news_and_publications/news_and_newsletters_2014/1274-the-revised-berec-common-positions-on-wholesale-local-access-wholesale-broadband-access-and-wholesale-leased-lines

² These are the definitions for wholesale access markets based on Commission Recommendation of Relevant Markets of 2007, referring to market 4 as wholesale physical network, market 5 as wholesale broadband access, market 6 as wholesale terminating segments of leased lines. The numbering and definition of these markets changed with the Commission Recommendation on Relevant Markets of 2014, hence, market 3a indicates wholesale local access provided at a fixed location, market 3b wholesale central access provided at a fixed location for mass-market products, market 4 wholesale high-quality access provided at a fixed location.

³

http://berec.europa.eu/eng/document_register/subject_matter/berec/regulatory_best_practices/methodologies/1478-methodology-for-monitoring-the-application-of-the-berec-common-positions-on-wla-wba-and-wll

circumstances and to provide information for its own harmonisation efforts. The phase 1 report was adopted in December 2014 (BoR (14) 171)⁴. In 2015, BEREC carried out its second (phase 2) monitoring exercise and the report was adopted in December 2015 (BoR (15) 199)⁵.

During 2016, BEREC carried out the third and final (phase 3) of the monitoring exercise focusing on NRAs which had completed their market notifications between mid-2015 to mid-2016. In phase 3, there were eight notifiers for each of the three relevant markets.

Participants in phases 1-3 of CP monitoring exercises

	Market 3a	Market 3b	Market 4
Phase 1 participant NRAs	Austria, Croatia, Cyprus, Estonia, Ireland, Latvia, Malta, Netherlands, Norway, UK	Austria, Croatia, Cyprus, Estonia, Ireland, Latvia, Malta, Netherlands, Norway, UK	Belgium, Greece, Ireland, Spain, Sweden, UK
Phase 2 participant NRAs	Bulgaria, France, Iceland, Luxembourg, Netherlands, Sweden, Turkey	Bulgaria, France, Iceland, Luxembourg, Poland, Sweden, Turkey	Austria, Croatia, Cyprus, France, Iceland, Italy, Latvia, Luxembourg, Turkey
Phase 3 participant NRAs	Czech Republic, Germany, Lithuania, Serbia, Denmark, Italy, Romania, Spain	Czech Republic, Germany, Lithuania, Serbia, Denmark, Italy, Romania, Spain	Bulgaria ⁶ , Czech Republic, Poland, UK, Lithuania, Serbia, Spain

The results of the third phase of the monitoring exercise were summarised in a report which was approved for publication at the 28th BoR Plenary in Berlin in December 2016.

Document:

BoR (16) 219 – Monitoring implementation of the BEREC CP WLA, WCA, WHQAFL – Phase 3

Having completed the third and final monitoring exercise, BEREC now has a complete picture of how NRAs have been implementing best practice remedies in their latest rounds of market reviews.

During 2017, BEREC intends to carry out a comprehensive assessment of whether there is a need to review any of the CPs relating to Markets 3a, 3b and 4.

⁴http://berec.europa.eu/eng/document_register/subject_matter/berec/reports/4788-monitoring-implementation-of-the-berec-common-positions-on-wla-wba-and-wll-phase-i

⁵http://berec.europa.eu/eng/document_register/subject_matter/berec/reports/5547-monitoring-implementation-of-the-berec-common-positions-on-wholesale-local-access-wla-wholesale-central-access-wca-and-wholesale-high-quality-access-at-a-fixed-location-whqaf1-phase-2

⁶ Note that Bulgaria concluded that there was effective competition and therefore proposed to withdraw all remedies that had been imposed in its previous market 4 notification.

2.1.8 Input to the telecoms review with regard to oligopolies

European telecommunications markets have witnessed several developments, such as the increased uptake of bundled services and a trend towards consolidation via mergers and acquisitions, which may facilitate oligopolistic outcomes. It is possible that some oligopolistic markets settings develop in a non-competitive manner. For this reason in 2015 BEREC prepared a report on oligopoly analysis and regulation⁷ to assess whether the current regulatory framework and/or its practical application are adequate to tackle oligopolistic markets where there are competition concerns.

Several different issues were raised in the responses to the BEREC public consultation such as the need to further refine the definition of tight oligopolies or the criteria for identifying this market setting.

In light of these issues and taking account also of the review of the regulatory framework, in 2016 BEREC prepared an internal follow-up report on oligopolies analysis and regulation. This internal report set out the structural criteria for identifying tight oligopolies and their market effects and assessed (i) the possibilities and limits of the transposition of the SIEC test and other potential tools of *ex ante* regulation as well as (ii) the sufficiency of the existing non-SMP-based remedies to tackle the issues raised by tight oligopolies.

2.1.9 BEREC input on mergers and acquisitions

There has been a trend in recent years towards increasing consolidation in the telecommunication markets at a European level via mergers and acquisitions. This trend implies relevant changes in the market structure and dynamics for competition in the short and long term, both at European and national levels. Understanding the main trends and implications from these mergers and acquisitions is a key issue for BEREC and European NRAs.

In 2016, BEREC launched a project to assess the three latest mergers in the mobile markets in Austria, Germany and Ireland by analysing how they affected the development of consumer prices and, potentially, of investment. During 2016, BEREC carried out a tender procedure to acquire a comprehensive database of mobile tariffs, market indicators and investment figures in European countries. This database will also be used to prepare a BEREC report on this topic for publication in the second half of 2017.

2.1.10 Implementation of the Cost Reduction Directive

Under the Work Programme 2016, part of the task of the Regulatory Framework EWG was to focus on the Cost Reduction Directive⁸, which aims to facilitate and incentivise the rollout of high-speed electronic communications networks by enabling more efficient development of new physical infrastructure at lower cost.

⁷ 'BEREC Report on oligopoly analysis and regulation' BoR (15) 195. December 2015. http://berec.europa.eu/eng/document_register/subject_matter/berec/reports/5581-berec-report-on-oligopoly-analysis-and-regulation

⁸ Directive 2014/61/EU of the European Parliament and the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks.

The Directive provides for measures to increase the sharing and re-use of existing physical infrastructure and create the conditions for network deployment that is more cost efficient. Specific rules are set to foster coordination of civil engineering works and access to physical in-building infrastructure by promoting transparency of information. Therefore, Member States should make sure that all information regarding physical infrastructure, planned civil engineering works and also permit-granting procedures is available at a single information point. Should the access to the infrastructure or to information be denied, the parties involved are entitled to refer the issue to the competent national dispute settlement body. Most Member States have entrusted NRAs with tasks concerning dispute resolution.

Since the Directive has applied in full since 1 July 2016 and given there have been delays in the process of transposition into national law, BEREC looked into the early implementation experiences and Member States' specific laws, regulations and administrative provisions that were already in place. This was done to identify and address the challenges of applying the Directive, to enable cross-sector cooperation, especially with regard to broadband and smart grid deployment, and to promote cost savings in the rollout of high-speed networks. BEREC held an expert workshop on 13 October 2016 to take stock of the transposition experiences and exchange information on the challenges that Member States were facing in the implementation process.

2.2 Promoting the internal market

2.2.1. Preparation of the Framework Review

In 2016, BEREC continued its preparatory work on the review and held a number of workshops and meetings with other European institutions:

- BEREC and the Radio Spectrum Policy Group (RSPG) published a joint News Release on Spectrum and the Framework Review on 3 February 2016 (BoR (16) 24);
- BEREC had several meetings on this topic with the European Commission in the course of the year;
- BEREC published its high-level opinion on the review proposals on 13 December 2016.

At the end of 2016, BEREC started an in-depth analysis of the review proposals, in order to provide ad hoc input on specific issues depending on the request of the EU institutions and/or newly emerging needs.

2.2.2. BEREC Opinion on the Framework Review proposals

The European Commission published its proposals for the review of the electronic communications legislative framework on 14 September 2016. The package contains five proposals:

1. a Directive establishing the European Electronic Communications Code (EECC)⁹;
2. an amended regulation on BEREC¹⁰;
3. a regulation on the promotion of internet connectivity in local communities and public spaces¹¹;
4. two communications:
 - (a) on 5G for Europe¹²;
 - (b) on the European Gigabit Society¹³.

In 2016, as laid down in the work programme, BEREC further developed the reflections begun during 2015 and consolidated in its Opinion of December 2015.

The Opinion was adopted by BEREC at its 29th plenary meeting on 8 December 2016. It focuses on three important aspects of the Commission's proposals: the scope of the framework, the access regulation, and the institutional set-up. However, other important topics such as spectrum, services, provisions related to end users and universal service regime are also mentioned in the introductory part. As a next step, BEREC has started a more in-depth analysis of these topics and will seek to contribute to the legislative debate by sharing its expert views with the relevant institutions.

⁹ Proposed Directive establishing the European Electronic Communications Code

¹⁰ Proposed Regulation establishing the Body of European Regulators of Electronic Communications (BEREC)

¹¹ Proposed Regulation on the promotion of internet connectivity in local communities and public spaces (WiFi4EU)

¹² Communication – 5G for Europe: An Action Plan and accompanying Staff Working Document

¹³ Communication – Connectivity for a Competitive Digital Single Market - Towards a European Gigabit Society

Documents:

BoR (16) 24 – Joint BEREC/RSPG News Release on Spectrum and the Framework Review

BoR (16) 213 – BEREC high-level Opinion on the European Commission's proposals for a review of the electronic communications framework

2.2.3. Input to the Commission on the fair use of roaming services and the sustainability of the abolition of retail roaming surcharges

In a letter from 20 June 2016 the Commission requested BEREC to deliver an opinion on the Commission's first draft for the application of a fair use policy (FUP) and on the methodology for assessing the sustainability of the abolition of retail roaming surcharges.

The Commission's first draft was withdrawn early September 2016 and replaced by a completely new approach for the FUP which was endorsed by the College of Commissioners on 21 September. BEREC's input to the Commission was therefore based on this new approach, which foresees that customers should be able to use their mobile devices abroad for periodic travel in the EU and providing, at the same time, certain safeguard mechanisms for operators. BEREC's input to the European Commission includes an overall assessment of the impacts of roam like at home (RLAH), a summary of the main elements of the Commission's proposals for the FUP and the sustainability mechanism, and BEREC's assessment of the proposals for the Implementing Act.

Document:

BoR (16) 167 – BEREC input to the European Commission Implementing Act on fair use policy and sustainability of the abolition of retail roaming surcharges

2.2.4. Report on the wholesale roaming market

Regulation (EU) No 531/2012 (hereafter Roaming Regulation) as amended by Regulation (EU) 2015/2120 (the TSM Regulation) obliges mobile telecommunications operators not to levy any surcharge in addition to the domestic retail price on any EU roaming customer for any regulated voice call, SMS or use of data outside the customer's home country for periodic roaming from 15 June 2017 onwards.

This obligation depends on a comprehensive review of national wholesale roaming markets in the EU, and must be adopted by the co-legislators by 15 June 2017. On 26 November 2015, the European Commission began its public consultation on the review of national wholesale roaming markets, on FUP and on the sustainability mechanism referred to in the Roaming Regulation as amended by the TSM Regulation. This report is BEREC's response to the Commission's public consultation on its review of the national wholesale roaming markets.

The report assesses different scenarios for a wholesale roaming market regulation to accompany the implementation of the TSM Regulation, taking into account data on domestic price levels, consumption patterns, existing roaming offers and travel patterns as well as a broader analysis of the workings of the wholesale roaming market independent of the costs.

The analysis is mainly based on the information received from NRAs and the operators, to which a questionnaire was sent in mid-September 2015.

Document:

BoR (16) 33 – BEREC Report on the wholesale roaming market

2.2.5. Update of BEREC Guidelines on the Roaming Regulation

The TSM Regulation included amendments to the Roaming Regulation 531/2012. The revised BEREC Guidelines are an update of the earlier BEREC Guidelines on the Roaming Regulation, excluding those on Article 3 (BoR (12) 107) of 27 September 2012, and those on Articles, 4 and 5 (BoR (13) 82) of 5 July 2013.

This update was necessary as the TSM Regulation, incorporates substantial changes to the roaming regime. The update of the earlier BEREC Guidelines deals particularly with the implementation of the transitional regime, where from 30 April 2016 until 14 June 2017 operators are only allowed to charge a surcharge in addition to the domestic price, which shall not exceed the maximum wholesale charge for roaming services.

Document:

BoR (16) 34 – BEREC Guidelines on Regulation (EU) No 531/2012 as amended by Regulation (EU) 2015/2120 (excluding Articles 3, 4 and 5 on wholesale access and separate sale of services)

2.2.6. Input to the Commission Implementing Act on weighted average MTRs

According to Article 6e(2) of the Roaming Regulation, the Commission, after having consulted BEREC, has to review the Implementing Acts annually setting out the weighted average of maximum mobile termination rates (MTRs). As requested by the Commission's letter of 20 June 2016, BEREC collected the figures from NRAs, calculated the weighted average of the maximum MTRs and provided a response on 7 October 2016.

2.2.7. Periodic International Roaming Reports

2.2.7.1 Benchmark Report

According to Article 19 of the Roaming Regulation, BEREC is to regularly monitor the retail and wholesale roaming prices for voice, SMS and data services, as well as the volumes and revenues generated by the mobile operators across Member States. These benchmark data reports are widely acknowledged by the relevant stakeholders and are used by the Commission to review the effectiveness of the Regulation. BEREC published the 16th benchmark report in March 2016 and the 17th benchmark report in October 2016.

Documents:

BoR (16) 28 Rev.1 - International Roaming BEREC Benchmark Data Report April-September 2015

BoR (16) 170 - International Roaming BEREC Benchmark Data Report October 2015-March 2016

2.2.7.2 Report on Transparency and Comparability of Roaming Tariffs

Pursuant to Article 19 of the Roaming Regulation, BEREC is responsible for regularly monitoring the transparency and comparability of roaming tariffs, and presenting the findings in a report to be produced once a year. The objective of this report is to monitor and increase consumer awareness in light of the variety of roaming tariffs, as well as to increase transparent market conditions and the ability for customers to make well-informed decisions. The report addresses key questions on whether information on price and tariff conditions was made available in a clear and convenient way and whether consumers were able to compare those tariffs. Operators and regulators were asked several questions relating to these two key issues between July 2015 and July 2016. BEREC published its 4th BEREC Report on transparency and comparability of tariffs in November 2016.

This report takes into account the amendments made by the TSM Regulation. According to Article 6f(2) and Article 6e of the Roaming Regulation, roaming providers may apply a surcharge for regulated roaming services in the transitional period (from 30 April 2016 onwards) in addition to the domestic retail price..

Main findings are: In advance of the envisaged end to intra-EU roaming surcharges from 15 June 2017 pursuant to Article 6a, 37% of roaming providers in the EEA already offer roaming services at domestic rates. On the other hand, 54% of the respondents only apply the surcharges set out in Article 7(2), Article 9(1) and Article 12(1), i.e. – without charging the domestic component of the price. Furthermore, concerning fixed periodic roaming tariffs according to Article 6e(1), subparagraph 4, monthly and daily packages are the most relevant roaming tariffs which are offered by 57% and 35% of roaming providers in the EEA, respectively.

Document:

BoR (16) 217 – BEREC Report on Transparency and Comparability of International Roaming Tariffs

2.2.8. Opinions on Phase II cases

The procedures defined in Article 7/7a of the amended Framework Directive constitute one of the principal innovative features of the 2009 telecoms package. Since its first full year of operation in 2011, BEREC continues to fulfil this important role successfully and efficiently.

In 2016, the handling of Article 7/7a Phase II procedures remained an essential part of BEREC's work, although the number of cases continued the downward trend of recent years. During 2016, the Commission opened four Article 7/7a Phase II cases, compared with six cases in 2015. BEREC responded in a timely manner to four cases that required an expert opinion in 2016 – one opinion concerning a case opened in December 2015 and three opinions

regarding cases from 2016. One case opened in 2016 was discontinued following withdrawal of the notification by the concerned NRA before a BEREC Opinion was approved.

All the cases are outlined in the tables below:

A. Case DE/2015/1816 – Germany

Market	Call termination on individual public telephone networks provided at a fixed location (market 1 of the 2014 recommendation)
Description	<p>Phase II was opened under Article 7a on 16 December 2015.</p> <p>The BEREC Opinion was adopted on 27 January 2016 and published on 1 February.</p> <p>BEREC considered that the European Commission's serious doubts were justified in that (i) BNetzA's proposed termination rates (TRs) were not based on a pure BU-LRIC costing methodology which, as recommended by the Commission, generally results in a better competitive outcome, and (ii) BNetzA had not provided a valid justification for deviating from the TR Recommendation and in particular, had not provided evidence to support its view that this decision would be better suited to meet the policy objectives of promoting efficiency and sustainable competition and maximise consumer benefits than pure BU-LRIC.</p>
Outcome	<p>On 1 April 2016, the European Commission issued a recommendation that BNetzA should amend or withdraw the remedies relating to the price caps for termination rates in Germany in order to ensure that the evaluation of the efficient costs applied to termination markets was based on a pure BU-LRIC methodology.</p> <p>BNetzA adopted the final decision and published a reasoned justification for not following the recommendation according to Article 7a(7) of the Framework Directive.</p>
Document	BoR (16) 22 – BEREC Opinion on Phase II investigation pursuant to Article 7a of Directive 2002/21/EC as amended by Directive 2009/140/EC: Case DE/2015/1816 Wholesale call termination on individual public telephone networks provided at a fixed location in Germany

B. Cases AT/2016/1846-1847 – Austria

Markets	The market for wholesale call termination on individual public telephone networks provided at the fixed location and the market for wholesale voice call termination on individual mobile networks (markets 1 and 2 of the 2014 recommendation)
Description	<p>Phase II was opened under Article 7a on 22 March 2016.</p> <p>The BEREC Opinion was adopted on 4 May 2016 and published on 9 May.</p> <p>BEREC considered that the Commission's serious doubts were justified in that TTK proposed the application of fixed and mobile termination rates other than those based on pure BU-LRIC cost methodology to calls</p>

	<p>originating in certain EEA countries, and TTK had not provided a sufficient justification for a departure from the application of the regulated price that TTK intends to apply to the majority of EEA countries.</p> <p>On the other hand, BEREC took the view that the current situation, where some Member States did not follow the Termination Rates Recommendation, might result in undue financial losses for Austrian operators. In this context, TTK's decision to deviate from the Termination Rates Recommendation could allow Austrian operators to reduce capital outflows. However, BEREC believed that the draft measure would in turn lead to a situation that was not optimal</p>
Outcome	<p>On 25 July 2016, the European Commission issued a recommendation that TTK should amend or withdraw the remedies relating to the price control for fixed and mobile termination calls in order to ensure that the efficient costs of providing fixed and mobile termination call services are based on a pure BU-LRIC methodology, being the most appropriate methodology for the regulation of fixed and mobile termination rates.</p> <p>TTK withdrew its notification (AT/2016/1846-1847) on 25 January 2017.</p>
Document	BoR (16) 83 – BEREC Opinion on Phase II investigation pursuant to Article 7a of Directive 2002/21/EC as amended by Directive 2009/140/EC: Case AT/2016/1846-1847 Market for wholesale call termination on individual public telephone networks provided at the fixed location and the market for wholesale voice call termination on individual mobile networks (markets 1 and 2) in Austria

C. Case DE/2016/1885 – Italy

Market	Market for wholesale voice call termination on individual mobile networks in Italy (market 2 of the 2014 recommendation)
Description	<p>Phase II was opened under Article 7a on 28 July 2016.</p> <p>The BEREC Opinion was adopted on 6 September 2016 and published on 8 September.</p> <p>BEREC was of the opinion that the decision was at odds with the need to ensure that customers derive maximum benefits in terms of efficient cost-based termination rates, as no justification, economic or otherwise, for setting different termination rates for PosteMobile could be identified. Furthermore, BEREC agreed with the Commission that PosteMobile included several costs which did not appear to be directly related to the provision of termination services.</p>
Outcome	On 28 November 2016, the European Commission issued a recommendation that AGCOM should amend or withdraw the draft measures settling mobile termination disputes between PosteMobile and three mobile operators with SMP H3G, Fastweb and Telecom Italia,

	<p>respectively, and ensure that PosteMobile's mobile call termination rates are based on a pure BU-LRIC methodology.</p> <p>AGCOM adopted its final decision on 21 December 2016. AGCOM decided to follow the Commission recommendations and to modify the decision schemes accordingly. The termination rate on PosteMobile mobile network has been calculated using the pure BU-LRIC cost model.</p>
Document	BoR (16) 150 – BEREC Opinion on Phase II investigation pursuant to Article 7a of Directive 2002/21/EC as amended by directive 2009/140/EC: Case IT/2016/1885 Market for wholesale voice call termination on individual mobile networks (market 2) in Italy

D. Cases PT/2016/1888-1889 – Portugal

Markets	Wholesale local access provided at a fixed location (market 3a) and wholesale central access provided at a fixed location (market 3b) in Portugal
Description	<p>Phase II was opened under Article 7a on 29 July 2016.</p> <p>The BEREC Opinion was adopted on 8 September 2016 and published on 13 September.</p> <p>BEREC considered that the Commission's serious doubts were justified.</p> <p>BEREC was of the opinion that ANACOM had failed to deliver sufficiently convincing argumentation for not including a fibre access obligation on market 3a and (secondary) on market 3b in the non-competitive (NC) areas.</p>
Outcome	<p>On 29 November 2016, the European Commission issued a recommendation that ANACOM should amend or withdraw the remedies relating to the access obligations imposed on MEO in those areas of the wholesale local and central access markets corresponding to the NC areas identified at retail level where, on a forward looking basis, there are limits to the economic feasibility and likelihood of competitive NGA deployment and where there is no alternative wholesale access to NGA permitting sustainable competition, in order to address the Commission's concerns set out above.</p> <p>By decision of 22 December 2016, ANACOM approved a draft decision evaluating the European Commission's Recommendation of November 29th, 2016, thus presenting a reasoned justification for not changing and not withdrawing the draft final decision approved on June 30th, 2016 and therefore not following the European Commission's Recommendation. It was further decided to submit this draft decision to a prior hearing of interested parties, giving a period of 20 working days for stakeholders to comment.</p>

	Given the received comments, ANACOM adopted the final decision on 23 March 2017.
Document	BoR (16) 154 – BEREC Opinion on Phase II investigation pursuant to Article 7a of Directive 2002/21/EC as amended by Directive 2009/140/EC: Case PT/2016/1888 and 1889

2.2.9. Qualitative review of Phase II cases

In 2015 BEREC undertook a comprehensive analysis of Article 7/7a Phase II cases to assess how well the Article 7/7a process had been working. Within this context, the Article 7/7a Project Team of the Remedies EWG (REM EWG) conducted a survey among Phase II case team members and coordinators in order to gain a better understanding of all procedural and substantial aspects of the Article 7/7a process.

Based on the work carried out in 2015, in 2016 the REM EWG received the mandate to start drafting a new set of internal procedural guidelines to assist Article 7/7a case teams in formulating and issuing formal BEREC Opinions on Phase II cases.

At the end of 2015 the Commission Internal Audit Service (IAS) reviewed the activities under Articles 7/7a performed at the BEREC Office and concluded that the ‘processes are fit for purpose and are managed and organised in an effective and efficient manner’. Nonetheless the IAS also found some room for improvement in some main areas of the Article 7/7a process, which partially overlap with those highlighted in the BEREC Qualitative Assessment carried out in 2015. After assessing the recommendations of the IAS and analysing feedback from experts involved in the Article 7/7a procedure, the existing internal procedural guidelines were amended.

In December 2016, the revised internal Article 7/7a procedural guidelines were approved. The guidelines took into account the recommendation of the IAS and the outcome of the survey, in order to further improve the efficiency of the procedure especially the establishment of Article 7/7a Phase II EWGs.

2.2.10. Input to the review of the Termination Rates Recommendation

On 7 May 2009 the European Commission adopted its Recommendation 2009/396/EC on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, aiming for coherent regulation in termination markets across the EU. This Recommendation was due for review no later than by the end of 2016.

BEREC responded to the consultation launched by the European Commission on this Recommendation (running from March to June 2016). The response to the consultation was based on the work and analysis carried out by BEREC in previous years.

The response recalled the benefits of setting the termination rates at a pure BU-LRIC level, in line with the Recommendation. It showed the positive effects of a consistent approach across Europe, for national markets as well as the development of an internal market.

The document recognised that the Recommendation had been successful in reducing termination rates across the EU. However, despite the significant and widespread decrease of rates, there are still differences between countries, and the Recommendation itself has some limitations. Today, the majority of Member States have their fixed and mobile TRs set at a level consistent with the Recommendation, but some Member States do not follow the Recommendation's principles.

BEREC underlined this divergence as the main issue to address. BEREC suggested that making the principles of the Recommendation binding would be a solution. BEREC set out several options that could be chosen by the Commission such as an infringement procedure, a regulation or a decision based on Article 19 of the Framework Directive. For the long term, the document also suggested the regulatory burden might be lowered. The pros and cons of a common model or uniform rate across Europe were then discussed.

Document:

BoR (16) 100 – BEREC response to the European Commission's public consultation on the evaluation of the Termination Rates Recommendation

2.3 Empowering and protecting end users

2.3.1 Guidelines for the implementation of net neutrality (NN) provisions of the TSM Regulation

The TSM Regulation (Regulation (EU) 2015/2120) included a duty in Article 5(3) for BEREC to lay down guidelines for the implementation of the obligations of NRAs related to the supervision, enforcement and transparency measures for ensuring open internet access. BEREC's Net Neutrality Guidelines were published 30 August 2016. The Guidelines provide guidance for NRAs to take into account when implementing the rules and assessing specific cases.

After meetings with European-level stakeholders in December 2015 and a workshop with high-level academic, legal and technical experts in February 2016, BEREC launched a 6-week public consultation on the draft Guidelines. The number of 481 547 contributions received was unprecedented for a BEREC consultation, and coming from diverse categories of respondents: civil society, public institutions and independent experts, ISPs, content and application providers and other industry stakeholders.

With the adoption of the Guidelines, BEREC has provided NRAs with a basis to enforce the Regulation consistently. Going forward, BEREC will foster the ongoing exchange of experiences by NRAs of their implementation of the Regulation.

Document:

BoR (16) 127 – BEREC Guidelines on the Implementation by National Regulators of European Net Neutrality Rules

2.3.2 Regulatory assessment of QoS in the context of NN

Under the work programme for 2016, BEREC has started to develop a quality of service regulatory assessment toolkit for NRAs, in order to support the implementation of the net neutrality provisions of the Regulation (EU) 2015/2120. The work builds on regulatory best practice and previous BEREC guidance on internet access service (IAS) quality monitoring. The measuring methods will encompass both IAS as a whole as well as individual applications using IAS; they will assess the performance of those services on the one hand, and detect traffic management practices applied to or affecting those services on the other hand.

Furthermore, BEREC builds upon the findings from the 2014 BEREC NN QoS Monitoring Report and 2015 BEREC NN QoS Feasibility Study. Taking into account the various examples of NRAs which operate their own QoS measurement tools, and focusing on practical implementation aspects, BEREC will provide technical specifications for the various components of a QoS monitoring system (notably enabling the measurement of individual applications or types of applications).

This workstream is ongoing, and in 2017, the BoR will decide on the next steps, in particular whether to initiate the development of an opt-in quality monitoring software program based on these concrete technical specifications and to analyse the governance aspects of operation of such a monitoring system.

2.3.3 Accessibility workshop

On 5 October 2016, BEREC held a 'Workshop on the Accessibility of Communications Services' to take into account the needs of disabled end users. The workshop was focused in particular on broadcasting, other audio-visual services and the provision of online content.

One of the aims of the workshop was to learn more about the developing needs and expectations of disabled end users and the barriers to be overcome in order to promote accessibility. The organisations representing end users, including the Vilnius Multiple Sclerosis Association, the Blind and Partially-Sighted Union of Lithuania and the European Disability Forum provided their insights on these issues. They explained the many ways in which people may have difficulty using communications services. It is important to recognise that solutions should be flexible, rather than attempting to impose a 'one size fits all' approach. They also pointed out that, whilst technological development can bring new opportunities, there is also a risk it can raise new barriers. To avoid this, the needs of disabled end users should be considered when designing new products and services.

Representatives from the broadcasting sector also offered their perspectives. They discussed the ways in which they had promoted accessibility within their services, such as through the provision of subtitling, audio description, sign language and accessible electronic programme guides. They noted the steady progress under the Audiovisual Media Services Directive (AVMS Directive), which is currently under review by the European legislator, based on the proposal of the European Commission.

Among the other discussions at the workshop was the potential of new technology and technological convergence. For instance, several participants had experience of Hybrid Broadcast Broadband TV (HBBTV), including the promotion of accessibility through HBB4all. HBBTV, an open platform, allows broadcast TV to be combined with online content through a single user interface.

BEREC also heard from representatives of equipment manufacturers and online service providers. There were presentations about the capabilities of television sets, including customisable accessibility features. BEREC was also informed about object recognition technology being used to provide blind and partially-sighted people with a description of a photo, which may help to promote greater inclusion and interaction.

A common theme throughout the workshop was the importance of standardisation in promoting an integrated approach to accessibility. In this regard, the World Wide Web Consortium (W3C) discussed their Web Accessibility Initiative (WAI), which develops strategies, guidelines, and resources to help make the web accessible to people with disabilities. In particular, it highlighted four important principles for web accessibility: content should be perceivable, understandable, operable and robust.

Finally, a number of national regulators offered their views, explaining the ways in which accessibility has been promoted across Europe. They discussed the goals of equivalent access and choice for disabled end users of electronic communications services, whilst ensuring that obligations placed on service providers are proportionate and evaluating the socio-economic impact of accessibility measures. They also noted the potentially complex interaction of regulation and innovation and how regulation should incentivise, not impede innovation. This is particularly important in the context of technological development that has the potential to facilitate greater accessibility for disabled end users.

2.3.4 Fraud and misuse – Article 28(2) USD

In March 2013, BEREC published the report 'Article 28(2) USD Universal Service Directive: A harmonised BEREC cooperation process'. That document outlined recommendations for cross-border regulatory cooperation by NRAs in cases of fraud or misuse. Included in this report was a commitment to monitor the process and to review it as necessary.

In December 2016, BEREC prepared a report based on its review. This highlighted practical issues that arise when NRAs request cross-border cooperation or when responding to a request for cooperation. The report also identified possible improvements in the process.

The report presents a number of case studies from NRAs, drawing attention to the practical issues that individual NRAs encountered either when using the recommended cross-border process or when considering whether to use it.

Some of the recommendations of the report reiterate those that are still relevant from the 2013 report, including, inter alia, highlighting end-user protection measures with awareness campaigns and encouraging the inclusion of contract clauses to facilitate withholding revenue.

2.4 Horizontal and regulatory quality aspects

2.4.1 Benchmarking of termination rates

Following the work started by the ERG, BEREC has been collecting and publicly reporting information on MTRs. Data collection on FTRs and SMS termination rates started in 2011.

The TR benchmarking exercises have been developed in close cooperation with COCOM, and from 2013 the Commission has made use of the BEREC TR data in its annual publications on the telecom industry in Europe (DAS).

In 2016, BEREC twice collected TR data from its Members and Observers to monitor the changes in TRs and information on the regulatory mechanism used in determining them.

BEREC published two TR benchmark reports in 2016. The report on fixed and mobile TRs in the EU (from January to June 2016) was approved at the 27th plenary meeting, and the report on TRs at European level (July to December 2016) was approved at the 29th plenary meeting.

Documents:

BoR (16) 90 – BEREC Report on Termination rates at European level January 2016, June 2016

BoR (16) 218 – BEREC Report on Termination rates at European level (July 2016), December 2016

2.4.2 Report on Regulatory Accounting in Practice

This is the twelfth annual report in a series summarising the findings of a detailed survey of regulatory accounting frameworks across Europe. The information has been gathered from NRAs and covers the implementation of regulatory cost accounting methodologies, which include allocation as well as annualisation methodologies, systems and processes.

These regulatory accounting frameworks provide NRAs with financial information essential to facilitate some of their significant regulatory decisions such as setting price controls, monitoring compliance with *ex ante* obligations (such as cost orientation of charges and non-discrimination), and providing information for market reviews.

The document provides an up-to-date factual report on the regulatory accounting frameworks implemented by NRAs and an assessment of the level of consistency achieved. The report sets out an overview of the regulatory accounting frameworks updated to April 2016 and also illustrates, where possible, trends and comparisons with data collected each year, starting from 2006. For each graph showing trends, this year's report includes an origination/destination table of the changes over the period.

There is more detailed analysis concentrating on the Wholesale Line Rental (WLR) service and the following key wholesale markets: Wholesale Local Access (market 3a), Wholesale Central Access (market 3b) and Wholesale high-quality access (market 4). Moreover, an analysis is given of the cost base and allocation methodologies used for fixed (market 1) and mobile (market 2) termination markets.¹⁴

¹⁴ 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).

Furthermore, as in last year's report, additional structural data (e.g. population, market structure, infrastructure) were collected from NRAs to emphasise factors influencing NRAs regulatory strategy. Not surprisingly, considerable differences in the market/competitive situation as well as infrastructure in place can be observed between (and within) the countries that responded, reflecting different external and technical requirements which NRAs need to take into account.

The report also looks at annualisation methodologies provided by NRAs that responded. As in last year's report, accounting information for some products in market 3a, such as copper access (including LLU, SA, SLU), fibre access (LLU, VULA), dark fibre access and duct access are analysed further.

As in previous years, the report includes a section on actual implementation of the Termination Rates Recommendation 2009/396 of 7 May 2009.

This year the report also includes a further analysis about the implementation of Recommendation 2013/466/EU on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment of 11 September 2013 with regard to costing methodologies and price level (section 3.6.5 of the report).

This year the report provides an update of the 2013 report about WACC parameters used in different markets, also analysing the main methodologies used to estimate each parameter as needed to implement the CAPM model used by NRAs to estimate the cost of capital.

The document Regulatory Accounting in Practice 2016 was adopted at the third plenary meeting of 2016 (6/7 Oct. 2016) in Vilnius.

Document:

BoR (16) 159 BEREC Report Regulatory Accounting in Practice 2016

2.4.3 The emergence of new markets due to bundling trends

The Benchmarking (BMK) EWG produced an internal report to provide a view on the development of bundling practices and in particular to analyse the impact of additional services (AS) on ECS. This study was initiated due to the continuing growth in take-up of bundles and recent developments that society offers consumers.

The report presents the growing importance of AS in relation to ECS and how telecom operators are adjusting their business strategies by including AS in their offers.

The report also presents the most common AS bundled ECS offerings, based on a BEREC survey with data gathered from the operators' websites. The report shows that in most European countries, the majority of operators include entertainment-related AS such as VoD, premium TV channels, advanced TV functionalities and multiple screen TV in both standalone and bundled ECS offerings. These four TV-related AS are the most commonly integrated AS in ECS offers.

3 Representation and cooperation

3.1 Events, speeches and presentations

For an institution such as BEREC, it is of highest relevance to be in close contact with stakeholders, interested parties and EU institutions, EU bodies and groups such as ENISA and the RSPG. The BEREC Chair, the Vice-Chairs and other representatives, such as EWG Chairs, represented BEREC at a wide range of events in 2016. Most of the speeches and presentations given focused on BEREC's ongoing work on the implementation of the TSM Regulation, in particular the Net Neutrality Guidelines and the tasks related to roaming, and the Telecoms Review with its regulatory implications. Annex 10 lists the events attended by the BEREC Chair, the Vice-Chairs and other BEREC representatives.

3.2 Workshops

In 2016, BEREC organised a total of five workshops, three of which were held on the day before the plenary meetings.

The first workshop in 2016 took place in Rotterdam, preceding the 26th plenary meeting. As a further step in BEREC's work on developing guidelines for the implementation of the obligations of NRAs related to the new net neutrality rules, NRAs' Heads heard from high-level academic, legal and technical experts in the field of net neutrality. Together with the RSPG, BEREC held a joint BEREC/RSPG expert workshop on spectrum in Brussels on 17 March 2016. Following on from this, BEREC attended the RSPG workshop on strategic mobile coverage (Brussels, 8 November).

On 1 June, prior to the 27th plenary meeting, which took place in Vienna, BEREC held an internal workshop on challenges and drivers for NGA rollout and the infrastructure competition, in which experiences from several Member States were exchanged.

The next workshop was organised on 5 October, a day before the 28th plenary meeting in Vilnius, and focused on the accessibility of communications services, taking into account the needs of disabled end users. BEREC was joined for the event by several organisations representing European citizens and disabled people, as well as representatives of broadcasters, online service providers and equipment manufacturers, who shared their views and experience.

BEREC's last workshop of 2016 took place in Brussels on 13 October and was aimed at experts who exchanged their views regarding the implementation of the Cost Reduction Directive.

The list of the BEREC workshops in 2016 is also available in Annex 9.

3.3 BEREC Stakeholder Forum

The 4th annual BEREC Stakeholder Forum meeting was held on 17 October 2016 in Brussels. The event was organised under the leadership of the incoming BEREC Chair (ARCEP) and gathered together more than 160 participants.

The Stakeholder Forum was split into two sessions. The first was dedicated to the connectivity challenges, during the second session, panellists discussed the fast changing digital environment.

After an introduction by the current BEREC Chair, Wilhelm Eschweiler, the incoming BEREC Chair for 2017, Sébastien Soriano, made opening remarks highlighting the role BEREC will play in 2017 to contribute to the priorities set by the EU institutions for the telecoms sector. In the Work Programme 2017, Mr Soriano reminded the forum that BEREC was committed to paving the way for a pro-investment regulatory environment based on competition, which would enhance fixed and mobile connectivity. Preserving an open environment in the telecoms and digital sectors, which was critical to empower end users, new entrants and innovation, will be another top priority for BEREC next year.

The forum continued with the first round table, moderated by Sharon White, Chief Executive of Ofcom, which discussed how to enhance connectivity in Europe. The role of competition in fostering investment and thus providing the best connectivity to every citizen was highlighted by the speakers. In particular, they agreed that “Fibre is the end game”, although different views were expressed about the need to promote interim solutions in the meantime. The importance of the use of radio spectrum and a consistent regulatory framework to facilitate this were also stressed during the discussion. Mention was made of the necessity to adapt regulation to present-day challenges, underlining the importance of the current telecoms review.

The first panel of speakers was composed of Pilar del Castillo, Member of the European Parliament; Eelco Blok, CEO of KPN; Xavier Niel, Deputy Chairman of the Board of Directors & Chief Strategy Officer of Iliad; Sam Crawford, Founder of SamKnows.

The second round table, moderated by Johannes Gungl, Managing Director of RTR, was dedicated to the development of the digital economy and its interaction with the telecoms sector. During this session, the panel emphasised the importance of convergence between networks and content, as well as the value of partnerships between telecommunications sector and start-ups in stimulating innovation. They also highlighted the central role of end users and regulation in the digital economy, in particular net neutrality rules.

This second round table included Gavin Patterson, CEO of BT Group, Martin Kaiser, VP Services Division at Hager Group, Annina Koskiola, CEO of Proximi.io; and Winston Maxwell, a renowned expert on net neutrality.

During his closing remarks, European Commissioner for Budget and Human Resources Günther Oettinger agreed that regulators would play an important part in the digital transformation. He also stressed the need for a strong telecoms sector so that Europe could deliver the Gigabit Society by 2025. He said that the adoption of the proposal for an EECC without delay, together with new spectrum rules, would be crucial in this regard. Commissioner Oettinger reminded the forum of the strategic role that BEREC would play in this process.

The 4th Stakeholder Forum was web-streamed and the recorded videos are available on the BEREC website.

3.4 International cooperation

At multilateral level and in addition to other ad hoc initiatives, BEREC developed its international cooperation policy during 2016, by improving relations with three regional regulator groups, EMERG, EaPeReg and Regulatel, and also by undertaking other initiatives with different interlocutors.

Regarding the cooperation with the above mentioned three regulators groups, BEREC promoted several activities, in view of the planned initiatives set at the different memoranda of understanding (MoU), as follows:

1. Regulatel

During 2016, this cooperation relationship was further developed by assuring the participation of BEREC experts at two Regulatel's EWGs (namely at the Net Neutrality EWG and Internet of Things sub-group), which met from 15 to 17 March in Guatemala. Furthermore, the year's annual BEREC-Regulatel high-level summit took place in Cancun, Mexico, during the week of 20-24 June, after the OECD Ministerial Meeting on 'Digital Economy: Innovation, Growth and Social Prosperity', addressing issues and common challenges on net neutrality, international roaming and OTTs. Finally, Regulatel's plenary meeting took place in Santiago del Chile, from November 28-29, where the Under-Secretary of State for Telecommunications from Chile took the Presidency for 2017. BEREC participation included presentations on Article 7 procedures, 2016 work developments, working plan for 2017, and the Commission's proposal for the review of the telecoms framework.

2. EMERG

An annual joint workshop on regulation of voice services was organised in Brussels on 5-6 December 2016. The BEREC International Roaming EWG Co-Chair attended and special attention was given to international roaming issues, namely the TSM Regulation, the wholesale caps regulation and the transparency provisions, as well as NRAs' competencies in this area. On 26-27 October 2016, the NGN EWG delivered a presentation on BEREC initiatives on IoT, during the EMERG IoT workshop in Lisbon.

3. EaPeReg

Regarding the cooperation with the Eastern Partnership (Armenia, Azerbaijan, Belarus, Georgia, the Republic of Moldova and Ukraine) Electronic Communications Regulators Network (EaPeReg), it is worth mentioning that this group gave special attention to international roaming issues. The annual joint workshop on the Roaming Regulation was organised on 21 November 2016 in Bucharest, followed by the EaPeReg Plenary on 22 November 2016. BEREC actively participated in this workshop.

In accordance with the **MoU with the Federal Communications Commission (FCC)**, the US sector regulator, BEREC organised three videoconferences, on spectrum (7 June 2016), net neutrality (22 September 2016), and recent regulatory developments, with special attention being given to the regulatory framework for the sector in the EU (13 October 2016), the latter with the participation of the European Commission.

Further to this, BEREC has also developed **initiatives with other interlocutors**, namely:

1. with **ITU**, at the ITU TELECOM World 2016, on 14 November 2016, in which BEREC was a panellist in the Leadership Summit;
2. with the **OECD**, with which BEREC organised the 3rd BEREC expert workshop on IP interconnection in Brussels on 21 November 2016.

Finally, there were contacts with European Commission regarding the project on Harmonisation of the ICT Policies in Sub-Saharan Africa in Africa. Further specific developments are expected for this project during 2017.

By the end of 2016, BEREC's proposed international cooperation activities plan was fully accomplished. This contributed not only to enhancing BEREC's visibility and influence, but also to promoting the European regulatory approach, while keeping abreast of other regions' regulatory know-how, so that BEREC was more aware of its counterparts' positions.

BEREC international mission to the United States

BEREC organised an international mission to the United States (US) in order to gain insights from a broad spectrum of organisations and on the sector's developments worldwide.

The BEREC delegation held meetings with academia (MIT, Princeton, Columbia,), operators (AT&T, Verizon, Cogent), OTT players (Google, Facebook), start-up organisations (Computer and Communications Industry Association), financial institutions (HSBC, Goldman Sachs, JPMorgan Chase, Morgan Stanley), and think tanks (Information Technology and Innovation Foundation, New American Foundation). The delegation also met the Federal Communications Commission (Chairman Tom Wheeler), the US State Department, and the US Department of Commerce (National Telecommunications and Information Administration).

While the topics covered are similar to the ones in Europe (net neutrality, next generation communications, convergence, OTT players, etc.), the market structures in the US and Europe are often quite different, resulting in different regulatory responses.

3.5 Engagement with European Union institutions

BEREC again demonstrated its commitment to working in close cooperation with EU institutions in 2016. At the beginning of the year, the BEREC Chair met the Director General of DG CNECT in Brussels, followed by a meeting between BEREC and the Commission in April 2016 to discuss the forthcoming review of the EU regulatory framework for electronic communications. On 6 July, a high-level meeting of the BEREC Chair and the Vice-Chairs with Commissioner Günther Oettinger also focused on the telecoms review. In addition, the BEREC Chair and representatives from the European Commission met via videoconference a few days before each of the BEREC plenaries to prepare those meetings.

BEREC provided regular input on items such as TR development and changes in roaming charges. BEREC also responded to several public consultations of the Commission (e.g. on the review of the telecoms framework and the Termination Rates Recommendation.)

In June 2016, the BEREC Chair attended a meeting of the Council Working Party on Telecommunications and Information Society in Brussels. He introduced the BEREC activities in 2016 and for 2017 including the three strategic pillars on which the work programme is based. The presentation highlighted BEREC's work on the draft Net Neutrality

Guidelines, the second part of the TSM follow up regarding international roaming, and the telecoms review, such as with regard to oligopolies, OTT services, and NGN.

BEREC maintained regular contacts with the European Parliament, such as a presentation by the BEREC Chair of the BEREC Opinion on the telecoms review and other ongoing activities during a meeting of the Committee on Industry, Research and Energy (ITRE) in Brussels on 28 January. This was followed by four other meetings during 2016 where BEREC informed Members of the European Parliament and the ITRE Secretariat about several aspects of the telecoms review, such as connectivity / access regulation, OTT services, spectrum, and the institutional set-up.

During the year, BEREC and its representatives exchanged views on several issues, mostly with regard to the telecoms review, with other European institutions. Several times in 2016, the BEREC Chair and the Chair of the RSPG met. In addition a BEREC representative participated in a meeting of the ENISA Permanent Stakeholders' Group and a meeting with the European Economic and Social Committee.

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

4 Organisational issues

4.1 BEREC Chair and Vice-Chairs

BEREC Chair and Vice-Chairs for 2016

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 of the Vice-Chairs is 1 year. In compliance with the provision of Article 2(1) of the Rules of Procedure of the BoR, before serving her/his term as Chair for 1 year, the Chair firstly has to serve as a Vice-Chair for 1 year. To ensure the continuity of BEREC's work, the Chair also has to serve as a Vice-Chair for the year following their 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 last ordinary plenary meeting for 2015, the BoR decided to elect two additional Vice-Chairs for 2016. Following the elections, the BoR was led by the following Chair and Vice-Chairs in 2016:

BEREC Chair for 2016:

- Wilhelm Eschweiler, Vice-President of BNetzA (Germany), elected Chair 2016 at the 21st BoR meeting (4-5 December 2014, Brussels).

BEREC Vice-Chairs for 2016:

- Sébastien Soriano, President of ARCEP (France), BEREC Chair for 2017, and Vice-Chair for 2016;
- Fátima Barros, President of the Board of ANACOM (Portugal), BEREC Chair for 2015 and Vice-Chair for 2016;
- Angelo Marcello Cardani, President of AGCOM (Italy);
- Henk Don, Member of the Board of ACM (The Netherlands).

Election of BEREC Chair for 2018 and Vice-Chairs for 2017

Every year the BoR appoints the Chair for the year after next and the Vice-Chairs for the following year.

During its 29th plenary meeting (8-9 December 2016, Berlin), in compliance with the procedure described above, the BoR elected Johannes Gungl, Managing Director of RTR (Austria), BEREC Chair for 2018, Alejandra de Iturriaga Gandini, Director of CNMC (Spain) and Stephen Unger, Board Member of Ofcom (United Kingdom), BEREC Vice-Chairs for 2017.

Pursuant to the BoR Rules of Procedure, the elected Chair 2018 (as above) and the Outgoing Chair 2016 (Wilhelm Eschweiler), will serve as Vice-Chairs in 2017 to support Sébastien Soriano, President of ARCEP (France), who was elected Chair for 2017 at the 25th plenary meeting (9-10 December 2015, London).

4.2 BEREC working structure

Expert Working Groups

Following a successful reform of BEREC EWGs' structure in 2014 and the 2015 appointment of EWG co-Chairs, 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 with the drafting and adoption of the BEREC Net Neutrality Guidelines.

As foreseen in the internal arrangements, in late 2016, new EWG Co-Chairs were appointed, based on a comparative evaluation of the candidates using specific criteria.

The structure used to support BEREC's work in 2016 is presented in Annex 5.

BEREC main meetings

BEREC's BoR held four ordinary plenary meetings in 2016. 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. In addition, there was one extraordinary plenary meeting on 25 August in Brussels to adopt the BEREC Net Neutrality Guidelines which had to be published by 30 August.

The list of Members and Observers of the BoR is presented in Annex 6 and the lists of the BEREC BoR and Contact Network meetings in 2016 are available in Annexes 7 and 8.

Annexes**Annex 1 Meetings with EU institutions and other EU bodies****A. Meetings with the European Commission**

Dates/Place	Event
19 February 2016, Brussels, Belgium	Meeting between the BEREC Chair and the Director General of DG CONNECT, European Commission
21 April 2016, Brussels, Belgium	Meeting between BEREC and the Commission on the forthcoming review of the EU regulatory framework for electronic communications
31 May 2016, videoconference	Meeting between the BEREC Chair and the Commission to prepare the BEREC plenary meeting
6 July 2016, Brussels, Belgium	High-level meeting of the BEREC Chair and Vice-Chairs with Commissioner Günther Oettinger
23 August, 2016 videoconference	Meeting with Commission representatives to prepare the extraordinary BEREC plenary meeting
4 October, 2016 Brussels, Belgium	Meeting between the BEREC Chair and the Commission to prepare the BEREC plenary meeting
5 December 2016, videoconference	Meeting between the BEREC Chair and the Commission to prepare the BEREC plenary meeting

B. Meetings with the European Parliament

Dates/Place	Event
28 January 2016, Brussels, Belgium	Presentation of the BEREC Opinion on Review of the Telecoms Framework and other ongoing activities at the meeting of the Committee on Industry, Research and Energy (ITRE) by the BEREC Chair
25 April 2016, Brussels, Belgium	Meeting between the BEREC Chair and Members of the European Parliament
15 June 2016, Brussels, Belgium	Meeting of the ITRE working group on Digital Union on governance of the telecoms market
15 November 2016, Brussels, Belgium	Meeting with the ITRE Secretariat
15 November 2016, Brussels, Belgium	Meeting between the BEREC Chair and Members of the European Parliament

C. Meetings with the Council of the EU

Dates/Place	Event
16 June 2016, Brussels, Belgium	Council Working Party on Telecommunications and Information Society

D. Meetings and workshops with other EU bodies

Dates/Place	Event
18 January 2016, London, United Kingdom	Meeting between the BEREC Chair and the Chair of the RSPG
5 April 2016, Athens, Greece	Participation in the meeting of the ENISA Permanent Stakeholders' Group
15 June 2016, Brussels, Belgium	Meeting between the BEREC Chair and the Chair of the RSPG
7 July 2016 videoconference	Meeting on the cooperation between BEREC and ENISA
2 November 2016, Mainz, Germany	Meeting between the BEREC Chair and the Chair of the RSPG
15 November 2016, Brussels, Belgium	Meeting with the European Economic and Social Committee

Annex 2 Public debriefings and BEREC engagement with stakeholders

Dates/place	Event
2 March 2016, Brussels, Belgium	Public debriefing on the 26th plenary meeting
6 June 2016, Brussels, Belgium	Press conference combined with public debriefing and launch of BEREC Net Neutrality public consultation
30 August 2016, Brussels, Belgium	BEREC press conference – launch of the BEREC Net Neutrality Guidelines
5 October 2016, Vilnius, Lithuania	BEREC workshop on equivalent access and choice for disabled end users
12 October 2016, Brussels, Belgium	Public debriefing on the 28th BEREC plenary meeting
17 October 2016, Brussels, Belgium	4th BEREC Stakeholder Forum meeting
14 December 2016, Brussels, Belgium	Public debriefing on the 29th BEREC plenary meeting

Annex 3 International events

Dates/Place	Event
15-17 March 2016, La Antigua (Guatemala)	BEREC- Regulatee Working Groups on NN and IoT(working/expert level)
7-8 April 2016, Riga	EaPeReg workshop on regulatory governance (working/expert level)
11-12 April 2016, Warsaw	<p>ITU-European Commission Regional Conference for Europe on ‘Broadband Services and Infrastructure Mapping’</p> <p>The Conference was organised by the International Telecommunication Union (ITU) and European Commission in Partnership with the Office of Electronic Communications of Republic of Poland.</p> <p>The conference provided an opportunity for high-level dialogue between the Telecommunication Development Bureau (BDT) of the ITU, the Commission, and ITU Member States and Sector Members with particular emphasis on national, regional and international broadband services and infrastructure mapping initiatives, as well as the ways how such undertakings may provide the value for policy makers, regulators, market, as well as end users. BEREC representative took part in the conference and presented BEREC’s work in this area.</p>
22-27 May 2016, USA	<p>BEREC Board study trip to the United States</p> <p>In spite of its primary focus being on the European market, it has become increasingly important for BEREC to engage, within the limits of its remit, in dialogue with other stakeholders outside the EU.</p> <p>In this context, every year, BEREC organises an international mission to a country outside the EU in order to gather insights into the main activities on that country’s electronic communications market, to exchange views regarding business models and to promote bilateral relations.</p>

Dates/Place	Event
	A BEREC delegation visited the United States and held several meetings with organisations and companies related to the electronic communication and information technology sector, such as universities, regulatory authorities, policy makers, content providers, electronic communications providers, start-ups, think tanks and investment funds. The purpose of this mission included the discussion of topics such as different regulatory models in Europe and the United States, future business models and investment perspectives, Internet of Things, open standards, (ultra)broadband or 5G.
7 June 2016, via video conference	Videoconference between BEREC Regulatory Framework EWG and FCC (USA)
20-23 June 2016, Cancún, Mexico	<p>OECD Ministerial Meeting on the Digital Economy: Innovation, Growth and Social Prosperity</p> <p>The BEREC Chair for 2016 represented BEREC at the OECD Ministerial Meeting on the ‘Digital Economy: Innovation, Growth and Social Prosperity’ which took place in Cancún, Mexico, from 20-23 June 2016. In particular, he was a speaker in the panel discussions regarding ‘Tomorrow’s Internet of Things (IoT)’ on 23 June 2016 where he discussed the OECD report on IoT and highlighted the main messages of the BEREC report on ‘Enabling the Internet of Things’.</p>
24 June 2016, Cancún, Mexico	<p>BEREC-Regulatel Summit</p> <p>BEREC and its counterpart from Regulatel (Latin American Forum of Telecommunications Regulators) met on 24 June 2016 in Cancún (Mexico) for a high-level summit to discuss the current challenges for the electronic communications sector. The BEREC Chair for 2016 introduced to the audience the current BEREC work programme, outlining the main issues BEREC is working on.</p> <p>The BEREC Chair explained how the BEREC work programme addresses current regulatory challenges and its aim to prepare for the new challenges that result from the market developments and technological changes.</p>

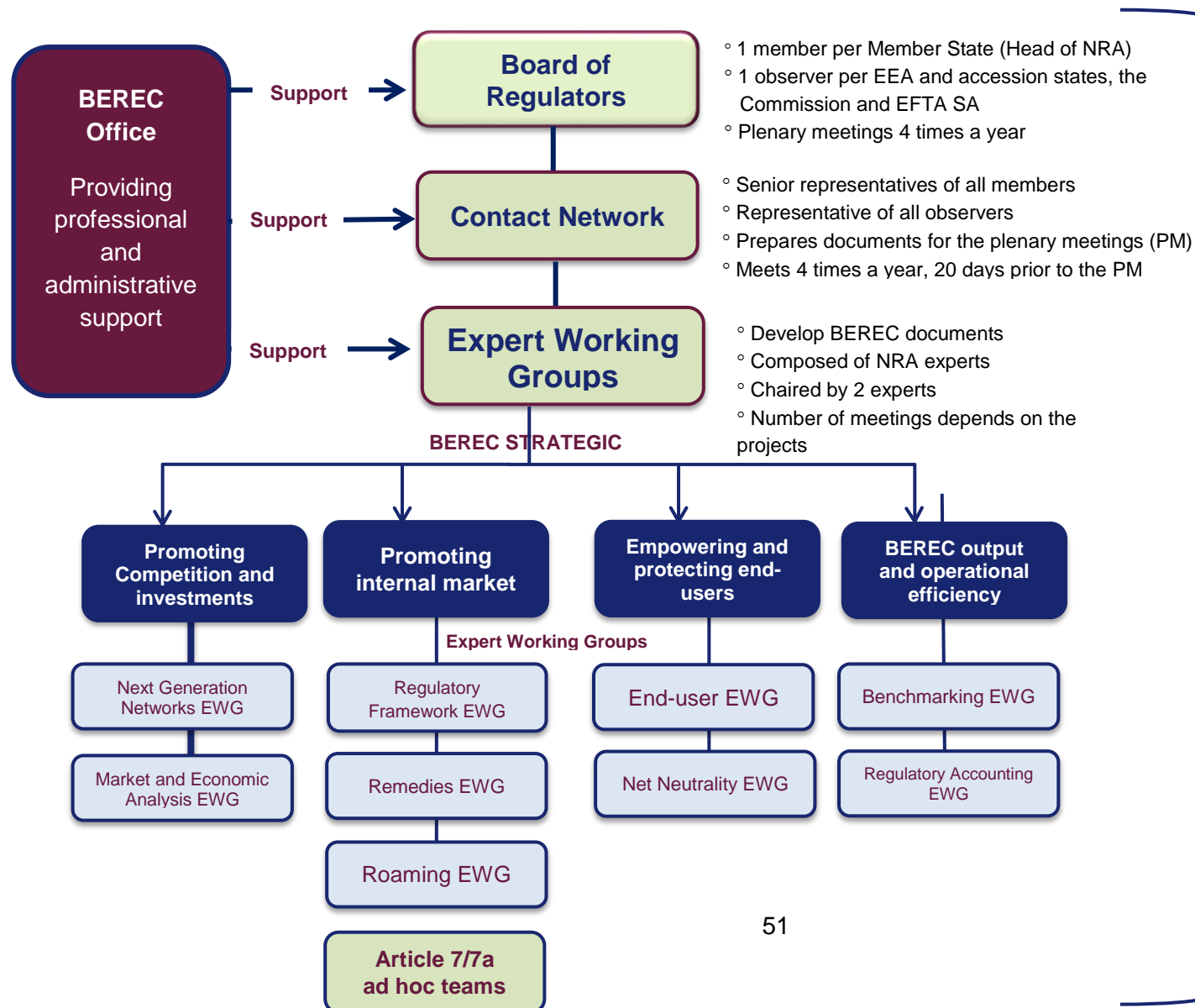
Dates/Place	Event
15-16 September 2016, Geneva, Switzerland	BEREC presentation at the ITU International Mobile Roaming Consultation Meeting
22 September 2016, videoconference	BEREC – FCC videoconference on net neutrality
13 October 2016, videoconference	BEREC – FCC videoconference on telecommunications regulatory framework
21-22 November, Washington	Meetings with FCC, think tanks and stakeholders
21 November 2016, Bucharest, Romania	BEREC representatives participation in EaPeReg Technical Workshop on International Roaming
28-30 November, Santiago, Chile	<p>Regulatel plenary and a conference on ‘Global Challenges in the Digital Era: Regional Integration, Common Policies and Institutional Dilemmas’</p> <p>BEREC representatives attended the Regulatel plenary meeting and a conference on ‘Global Challenges in the Digital Era: Regional Integration, Common Policies and Institutional Dilemmas’ which took place in Santiago, Chile on 28-30 November 2016.</p> <p>The main purpose of the conference was to propose a general approach to contextualise Latin-American goals such as: international roaming, regulatory harmonisation and the creation of a regional digital market. BEREC representatives presented European perspective and BEREC experience in these areas.</p>

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

Dates/Place	Event
21-22 January 2016, Hamburg, Germany	Meeting between the BEREC Chair and Vice-Chairs
26-27 January 2016, Brussels, Belgium	Meeting between the BEREC Chair and EWG Chairs
10 February 2016, videoconference	Meeting between the BEREC Chair and Vice-Chairs
24 February 2016, Rotterdam, The Netherlands	Meeting between the BEREC Chair and Vice-Chairs
13 April 2016, videoconference	Meeting between the BEREC Chair and Vice-Chairs
1 June 2016, Vienna, Austria	Meeting between the BEREC Chair and Vice-Chairs
20 July 2016, Brussels, Belgium	Meeting between the BEREC Chair and EWG Chairs
23 August, 2016 (videoconference)	Meeting between the BEREC Chair and Vice-Chairs

Dates/Place	Event
24 August 2016, Brussels, Belgium	Meeting between the BEREC Chair and Vice-Chairs
19-21 September 2016, Weimar, Germany	Meeting between the BEREC Chair and Vice-Chairs
5 October 2016, Vilnius, Lithuania	Meeting between the BEREC Chair and Vice-Chairs
23 November 2016, videoconference	Meeting between the BEREC Chair and Vice-Chairs
7 December 2016, Berlin, Germany	Meeting between the BEREC Chair and Vice-Chairs
15-16 December 2016, Bonn, Germany	Meeting between the BEREC Chair for 2016 and Chair 2017 and 2018 teams (handover meeting)

Annex 5 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's forum
- Public debriefings

**Annex 6 BEREK Members and Observers of the Board of Regulators by
end 2016**

Country (if applicable)	Title	Name(s)	Surname(s)	Name of Organisation	Member or Observer
Albania	Mr	Piro	Xhixho	Electronic and Postal Communications Authority of Albania, AKEP	Observer
Austria	Mr	Johannes	Gungl	Austrian Regulatory Authority for Broadcasting and Telecommunications, RTR-GmbH	Member
Belgium	Mr	Jack	Hamande	Institut Belge des Postes et Télécommunications, IBPT / BIPT	Member
Bulgaria	Dr	Veselin	Bozhkov	Communications Regulation Commission, CRC	Member
Croatia	Dr	Dražen	Lučić	Croatian Regulatory Authority for Network Industries, HAKOM	Member
Cyprus	Mr	George	Michaelides	Office of the Commissioner of Telecommunications and Postal Regulation, OCECPR	Member
Czech Republic	Dr	Jaromír	Novák	Czech Telecommunication Office, CTU	Member
Denmark	Ms	Betina	Hagerup	Danish Business Authority, DBA	Member
Estonia	Mr	Raigo	Uukkivi	Estonian Technical Regulatory Authority, ETRA	Member
Finland	Ms	Kirsi	Karlamaa	Finnish Communications Regulatory Authority, FICORA	Member

Country (if applicable)	Title	Name(s)	Surname(s)	Name of Organisation	Member or Observer
the former Yugoslav Republic of Macedonia	Mr	Sasho	Dimitrijoski	Agency for Electronic Communications, AEC	Observer
France	Mr	Sébastien	Soriano	Autorité de Régulation des Communications électroniques et des Postes, ARCEP	Member
Germany	Mr	Wilhelm	Eschweiler	Federal Network Agency, BNetzA	Member
Greece	Mr	Dimitrios	Tsamakis	Hellenic Telecommunications and Post Commission, EETT	Member
Hungary	Mr	Monika	Karas	National Media and Infocommunications Authority, NMHH	Member
Iceland	Mr	Hrafnkell	Gislason	Post and Telecom Administration, PTA	Observer
Ireland	Mr	Kevin	O'Brien	Commission for Communications Regulation, COMREG	Member
Italy	Prof.	Angelo Marcello	Cardani	Autorità per le Garanzie nelle Comunicazioni, AGCOM	Member
Latvia	Mr	Rolands	Irkliis	Public Utilities Commission, SPRK	Member
Liechtenstein	Mr	Kurt	Buehler	Office for Communications / Amt für Kommunikation, AK	Observer
Lithuania	Mr	Feliksas	Dobrovolskis	Communications Regulatory Authority, RRT	Member
Luxembourg	Mr	Luc	Tapella	Institut Luxembourgeois de Régulation, ILR	Member

Country (if applicable)	Title	Name(s)	Surname(s)	Name of Organisation	Member or Observer
Malta	Mr	Edward	Woods	Malta Communications Authority, MCA	Member
Montenegro	Mr	Zoran	Sekulić	Montenegro Agency for Electronic Communications and Postal Services, Ekip	Observer
Norway	Mr	Torstein	Olsen	Norwegian Communications Authority, Nkom	Observer
Poland	Ms	Marcin	Cichy	Office of Electronic Communications, UKE	Member
Portugal	Mrs	Fátima	Barros	Autoridade Nacional de Comunicações, ANACOM	Member
Romania	Mr	Marius Catalin	Marinescu	National Authority for Management and Regulation in Communications, ANCOM	Member
Serbia	Mr	Vladica	Tintor	Regulatory Agency for Electronic Communications and Postal Services, RATEL	Observer
Slovak Republic	Ing.	Vladimír	Kešjar	Regulatory Authority for Electronic Communications and Postal Services, RÚ	Member
Slovenia	Mr	Franc	Dolenc	Agency for Communication Networks and Services of the Republic of Slovenia, AKOS	Member
Spain	Ms	Alejandra	De Iturriaga	Comisión Nacional de los Mercados y la Competencia, CNMC	Member
Sweden	Ms	Catarina	Wretman	National Post & Telecommunications Agency, PTS	Member

Country (if applicable)	Title	Name(s)	Surname(s)	Name of Organisation	Member or Observer
Switzerland	Mr	Marc	Furrer	Federal Communications Commission, COMCOM	Observer
The Netherlands	Mr	Henk	Don	Authority for Consumers and Markets, ACM	Member
Turkey	Dr	Ömer Fatih	Sayan	Information and Communication Technologies Authority, ICTA	Observer
United Kingdom	Dr	Stephen	Unger	Office of Communications, OFCOM	Member
	Mr	Roberto	Viola	European Commission, EC	Observer
	Mr	Ólafur	Einarsson	EFTA Surveillance Authority, ESA	Observer

Annex 7 Plenary meetings of the Board of Regulators in 2016

Dates/place	Event	Agenda	Conclusions
25 February 2016, Rotterdam (The Netherlands)	26th meeting of the Board of Regulators	BoR (16) 41 ¹⁵	BoR (16) 62 ¹⁶
2-3 June 2016, Vienna (Austria)	27th meeting of the Board of Regulators	BoR (16) 89 ¹⁷	BoR (16) 124 ¹⁸
25 August 2016, Brussels (Belgium)	Extraordinary plenary meeting of the Board of Regulators	BoR (16) 126 ¹⁹	BoR (16) 157 ²⁰
6-7 October 2016, Vilnius (Lithuania)	28th meeting of the Board of Regulators	BoR (16) 158 ²¹	BoR (16) 205 ²²

¹⁵http://berec.europa.eu/eng/document_register/subject_matter/berec/board_of_regulators_meetings/agendas/5688-draft-agenda-for-the-26th-ordinary-plenary-meeting-of-the-berec-board-of-regulators-25-february-2016-rotterdam

¹⁶http://berec.europa.eu/eng/document_register/subject_matter/berec/board_of_regulators_meetings/meeting_conclusions/5996-conclusions-from-the-26th-bor-plenary-meeting-in-rotterdam-on-25-february-2016

¹⁷http://berec.europa.eu/eng/document_register/subject_matter/berec/board_of_regulators_meetings/agendas/6049-draft-bor-agenda-for-the-berec-27th-plenary

¹⁸http://berec.europa.eu/eng/document_register/subject_matter/berec/board_of_regulators_meetings/meeting_conclusions/6101-conclusions-from-the-27th-bor-plenary-meeting-in-vienna-on-2-3-june-2016

¹⁹http://berec.europa.eu/eng/document_register/subject_matter/berec/board_of_regulators_meetings/agendas/6118-draft-agenda-for-the-berec-extraordinary-bor-plenary-meeting

²⁰http://berec.europa.eu/eng/document_register/subject_matter/berec/board_of_regulators_meetings/meeting_conclusions/6189-conclusions-from-the-extraordinary-plenary-meeting-of-the-berec-board-of-regulators-25-august-2016-brussels

²¹http://berec.europa.eu/eng/document_register/subject_matter/berec/board_of_regulators_meetings/agendas/6193-draft-agenda-for-28th-bor-plenary-meeting-6-october-2016-vilnius-lithuania

²²http://berec.europa.eu/eng/document_register/subject_matter/berec/board_of_regulators_meetings/meeting_conclusions/6548-conclusions-from-the-28th-ordinary-plenary-meeting-of-the-berec-board-of-regulators-6-october-2016-vilnius

8-9 December 2016, Berlin (Germany)	29th meeting of the Board of Regulators	BoR (16) 211 ²³	BoR (16) 252 ²⁴
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²³http://bereg.europa.eu/eng/document_register/subject_matter/bereg/board_of_regulators_meetings/agendas/6560-draft-agenda-for-29th-bor-plenary-meeting-8-9-december-2016-berlin-germany

²⁴http://bereg.europa.eu/eng/document_register/subject_matter/bereg/board_of_regulators_meetings/meeting_conclusions/6645-conclusions-from-the-29th-bereg-plenary-meeting-8-9-december-2016-in-berlin-germany

Annex 8 2016 Meetings of the Contact Network established prior to the Board of Regulators

Dates/place	Event	Agenda	Conclusions
4-5 February 2016, Krakow (Poland)	1st Contact Network meeting for 2016	BEREC CN (16) 01 ²⁵	BEREC CN (16) 26 ²⁶
12-13 May 2016, Budapest (Hungary)	2nd Contact Network meeting for 2016	BEREC CN (16) 28 ²⁷	BEREC CN (16) 56 ²⁸
15-16 September 2016, Limassol (Cyprus)	3rd Contact Network meeting for 2016	BEREC CN (16) 57 ²⁹	BEREC CN (16) 86 ³⁰
17-18 November 2016, Jurmala (Latvia)	4th Contact Network meeting for 2016	BEREC CN (16) 88 ³¹	BEREC CN (16) 115 ³²

²⁵ http://berec.europa.eu/eng/document_register/subject_matter/contact_network_meetings/agendas/5633-draft-agenda-for-the-berec-2016-1st-contact-network-meeting-4-5-february-2016-krakow

²⁶ http://berec.europa.eu/eng/document_register/subject_matter/contact_network_meetings/meeting_conclusions/5669-conclusions-from-the-berec-2016-1st-contact-network-meeting-4-5-february-2016-krakow

²⁷ http://berec.europa.eu/eng/document_register/subject_matter/contact_network_meetings/agendas/6030-draft-agenda-for-berec-2016-2nd-contact-network-meeting-12-13-may-2016-budapest

²⁸ http://berec.europa.eu/eng/document_register/subject_matter/contact_network_meetings/meeting_conclusions/6041-conclusions-from-the-berec-2016-2nd-contact-network-meeting-12-13-may-2016-budapest

²⁹ http://berec.europa.eu/eng/document_register/subject_matter/contact_network_meetings/download/0/6157-draft-agenda-for-the-3rd-berec-contact-n_0.pdf

³⁰ http://berec.europa.eu/eng/document_register/subject_matter/contact_network_meetings/meeting_conclusions/6417-conclusions-of-the-berec-2016-3rd-contact-network-meeting

³¹ http://berec.europa.eu/eng/document_register/subject_matter/contact_network_meetings/agendas/6543-draft-agenda-for-the-berec-2016-4th-contact-network-meeting-17-18-november-2016-jurmala-latvia

³² http://berec.europa.eu/eng/document_register/subject_matter/contact_network_meetings/meeting_conclusions/6585-conclusions-from-the-4th-berec-contact-network-meeting-2016-in-jurmala-latvia

Annex 9 Internal BEREC workshops

Dates/Place	Event
24 February, 2016 Rotterdam, The Netherlands	BEREC workshop on net neutrality
17 March 2016, Brussels, Belgium	Joint BEREC/RSPG expert workshop on spectrum(expert level)
1 June 2016, Vienna, Austria	BEREC workshop – Challenges and drivers for NGA-rollout and the infrastructure competition
13 October 2016, Brussels, Belgium	BEREC technical workshop on the implementation of the Cost Reduction Directive (expert level)

Annex 10 Events attended by the BEREC Chair and/or Vice-Chairs on behalf of BEREC

Dates/Place	Event
12 January 2016, Rome, Italy	BEREC Chair participation in the IIC workshop 'Digital Europe: European and national policies to drive investments, market development and competition'
13 January 2016, Berlin, Germany	BEREC Chair meeting with the German parliamentary committee for the Digital Agenda
14 January 2016, Berlin, Germany	BEREC Chair participation in the Bitkom Forum TK and Media
21 January 2016, Brussels, Belgium	BEREC Chair representative participation in the GSMA Connected Living Workshop: Unlocking the Benefits of the 'Internet of Things' for Europe
26 January 2016, Brussels, Belgium	BEREC representative participation in the information event (organised on the initiative of the #NetCompetition alliance) at the European Parliament on broadband entitled 'Artificial scarcity: how data caps and zero rating harm consumers and innovation'
17 February 2016, Luxembourg	BEREC Chair representative participation in the FTTH Conference
23 February 2016, Barcelona, Spain	BEREC Chair participation in the GSMA Mobile World Congress Ministerial Programme
2 March 2016, Brussels, Belgium	BEREC Chair meeting with ECTA

15 March 2016, Brussels, Belgium	BEREC Chair meeting with BEUC, The European Consumer Organisation
16 March 2016, Brussels, Belgium	BEREC Chair participation in the Telecommunication and Media Forum
17 March 2016, Brussels, Belgium	BEREC Chair participation in AMCham EU's Annual Transatlantic Conference
6 April 2016, Brussels, Belgium	BEREC Chair representative participation in public workshop on 'Regulatory, in particular access, regimes for network investment models in Europe'
12 April 2016, Cyprus	BEREC Chair representatives participation in Electronic Comms Stakeholder meeting
20 April 2016, London, United Kingdom	BEREC Chair participation in the 10th Annual Digital Regulation Forum
29 April 2016, Bonn, Germany	BEREC Chair meeting with BT
2 May 2016, Brussels, Belgium	BEREC Chair representative participation in the Bruegel panel discussion "E-commerce in Europe: Lessons for parcel delivery from electronic communications"
16-17 May Boston, USA	BEREC Chair participation in the INTX Cable Conference

17 May 2016 , London, United Kingdom	BEREC Chair representative participation in Telecoms Law and Regulation Europe Conference
24 May 2016 Brussels, Belgium	BEREC Chair representative participation in ETNO/MLex Summit
25 May 2016, Brussels, Belgium	BEREC Chair representative participation in CERRE Executive Seminar
6 June 2016, Brussels, Belgium	BEREC Chair meeting with GSMA
16 June 2016, Brussels	BEREC Chair meeting with ECTA's House of Competition
20 June 2016, Brussels, Belgium	BEREC Chair representative participation in ANACOM workshop 'BEREC Guidelines on Net Neutrality
21 June 2016, Brussels, Belgium	BEREC Chair representative participation in a CEER workshop
22-23 June 2016, Brussels, Belgium	BEREC Chair representative participation in the 11th Annual European Spectrum Management Conference
27 June 2016, Bonn, Germany	Meeting between the BEREC Chair and Facebook

28-29 June 2016 London, United Kingdom	BEREC Chair participation in JP Morgan telecoms and Media CEO Conference
7 July 2016, Brussels, Belgium	BEREC Chair participation in third roundtable on connected and automated driving
7 July 2016, Brussels, Belgium	BEREC Chair meeting with ETNO
12 July 2016, Bonn, Germany	Meeting with Cisco
17-20 July 2016	BEREC Chair participation in IEFT 96(working/expert level)
20 July 2016, Brussels, Belgium	BEREC Chair meeting with Telenor
24 August 2016, Salzburg, Austria	BEREC Chair participation in the Salzburger TK-Forum
12 September 2016, Bonn, Germany	BEREC Chair meeting with Verizon
27 September 2016, Bonn, Germany	BEREC Chair participation in UBS investors meeting

27 September 2016, Brussels, Belgium	BEREC Chair representative participation in FT ETNO Summit
28 September 2016, Frankfurt, Germany	BEREC Chair representative participation in the 2016 Ultra-Broadband Forum
29 September 2016, Bratislava, Slovak Republic	BEREC Chair participation in the Digital Assembly 2016
10-11 October 2016, Bangkok, Thailand	BEREC Chair representative participation in the IIC International Regulators Forum
12 October 2016, Brussels, Belgium	BEREC Chair participation in CERRE Executive Seminar
13 October 2016, Brussels, Belgium	BEREC Chair participation in UBS investors meeting
13 October 2016, Brussels, Belgium	BEREC Chair participation on POLITICO's 2nd Annual Data Summit
17 October 2016, Brussels, Belgium	BEREC Chair participation in WIK Conference
18 October 2016, Brussels, Belgium	BEREC Chair participation in Competition Law and Regulation Conference

18 October 2016, Munich, Germany	BEREC Chair participation in Digital Regulation Round Table
10 November 2016, Brussels, Belgium	BEREC Chair representative participation in ECTA Regulatory Conference
15 November 2016, Brussels, Belgium	BEREC Chair participation in B-Day Going Giga
14 December 2016, Brussels, Belgium	BEREC Chair meeting with POLITICO
14 December 2016, Brussels, Belgium	BEREC Chair meeting with CCIA

Annex 11 Publicly available documents approved by the BoR in 2016

A. BEREC Opinions

Document number	Description	Date
BoR (16) 22	BEREC Opinion on Phase II investigation pursuant to Article 7a Case DE/2015/1816	27 January 2016
BoR (16) 83	BEREC Opinion on Phase II investigation pursuant to Article 7a of Directive 2002/21/EC as amended by Directive 2009/140/EC: Case AT/2016/1846-1847	4 May 2016
BoR (16) 133	BEREC Response to the EC questionnaire on the ePrivacy Directive	4 August 2016
BoR (16) 150	BEREC Opinion on Phase II investigation pursuant to Article 7a of Directive 2002/21/EC as amended by Directive 2009/140/EC: Case IT/2016/1885	6 September 2016
BoR (16) 154	BEREC Opinion on Phase II investigation pursuant to Article 7a of Directive 2002/21/EC as amended by Directive 2009/140/EC: Case PT/2016/1888 and 1889	8 September 2016
BoR (16) 167	BEREC input to the European Commission Implementing Act on fair use policy and sustainability of the abolition of retail roaming surcharges	13 October 2016
BoR (16) 213	BEREC high-level Opinion on the European Commission's proposals for a review of the electronic communications framework	30 November 2016

B. BEREC Reports

Document number	Description	Date
BoR (16) 28 Rev1	International Roaming BEREC Benchmark Data Report April – September 2015	1 March 2016
BoR (16) 33	BEREC Report on the wholesale roaming market	12 February 2016
BoR (16) 35	BEREC Report on OTT services	29 January 2016
BoR (16) 36	BEREC Report on the Public Consultation on the 'Report on OTT services'	29 January 2016
BoR (16) 38	BEREC report on the outcome of public consultations on the draft report on enabling Internet of Things	12 February 2016
BoR (16) 39	BEREC Report on Enabling the Internet of Things	12 February 2016
BoR (16) 90	Termination rates at European level January 2016	20 May 2016
BoR (16)128	BEREC Report on the outcome of the public consultation on draft BEREC Guidelines on the Implementation by National Regulators of European Net Neutrality rules	30 August 2016
BoR (16) 159	BEREC Report Regulatory Accounting in Practice 2016	6 October 2016
BoR (16) 160	International Roaming BEREC Benchmark Data Report October 2015 – March 2016	23 September 2016

Document number	Description	Date
BoR (16) 161	BEREC Report on the outcome of the Public Consultation on the draft BEREC Common Position on Layer 2 Wholesale Access Products	6 October 2016
BoR (16) 163	BEREC Report Case Studies on Migration from POTS/ISDN to IP on the Subscriber Access Line in Europe	6 October 2016
BoR (16) 170	BEREC Report on the Public Consultation of the Draft Document 'Challenges and drivers of NGA rollout and infrastructure competition'	6 October 2016
BoR (16) 171	BEREC Report 'Challenges and drivers of NGA rollout and infrastructure competition'	6 October 2016
BoR (16) 214	BEREC Report on the outcomes of the public consultation on the draft Work Programme for 2017	8 December 2016
BoR (16) 217	BEREC Report on Transparency and Comparability of International Roaming Tariffs	25 November 2016
BoR (16) 218	Termination rates at European level July 2016	25 November 2016
BoR (16) 219	Monitoring implementation of the BEREC CP WLA, WCA,WHQAFL - Phase 3	25 November 2016

C. BoR Decisions

Document number	Description	Date
BoR/2016/01	BoR Decision amending the Decision on the Establishment of a Public Register of the BEREC Documents of 29 September 2011	2 June 2016
BoR/2016/02	Decision of the Board of Regulators on confirmatory application for access to documents No BoR (16) 177	6 October 2016
BoR/2016/03	Decision of the Board of Regulators on confirmatory application for access to documents No BoR (16) 192	17 November 2016
BoR/2016/04	Decision of the Board of Regulators on BEREC Expert Working Groups 2017-2018	8 December 2016

D. Documents approved for public consultations

Document number	Description	Date
BoR (16) 94	Draft BEREC Guidelines on implementation by National Regulators of European net neutrality rules	2 June 2016
BoR (16) 95	Draft BEREC Common Position on Layer 2 Wholesale Access Products	20 May 2016
BoR (16) 96	Draft BEREC report on challenges and drivers of NGA rollout and infrastructure competition	2 June 2016
BoR (16) 169	Draft BEREC Work Programme 2017	7 October 2016

E. Annual work programme and annual reports

Document number	Description	Date
BoR (16) 66	BEREC Annual Reports 2015	26 April 2016
BoR (16) 215	BEREC Work Programme 2017	8 December 2016

F. Regulatory best practices

Document number	Description	Date
BoR (16) 34	BEREC Guidelines on Regulation (EU) No 531/2012 as amended by Regulation (EU) 2015/2120 (Excluding Articles 3,4 and 5 on wholesale access and separate sale of services)	12 February 2016
BoR (16) 127	BEREC Guidelines on the Implementation by National Regulators of European Net Neutrality Rules	30 August 2016
BoR (16) 162	BEREC Common Position on Layer 2 Wholesale Access Products	6 October 2016

G. Other documents

Document number	Description	Date
BoR (16) 97	Input paper on potential Regulatory Implications of Software-Defined Networking and Network Functions Virtualisation	6 June 2016

Document number	Description	Date
BoR (16) 100	BEREC response to the European Commission's public consultation on the evaluation of the Termination Rates Recommendation	2 June 2016
BoR (16) 216	4th BEREC Stakeholder Forum – summary of proceedings	25 November 2016

Annex 12 Board of Regulators' electronic voting procedures

No	Subject	Comments round		Voting round		Link to published document or other relevant information
		Start/link to docs	End	Start/link to docs	End/link to record	
1.	BEREC Opinion on Phase II investigation pursuant to Article 7a Case DE/2015/1816	18 January 2016	22 January 2016	26 January 2016	27 January 2016	The BEREC opinion approved by the BoR was published on the BEREC website under BoR (16) 22
2.	BEREC Annual Activity Reports 2015	11 April 2016	18 April 2016	19 April 2016	27 April 2016	The BEREC Annual Activity Report was approved by the BoR was published on the BEREC website under BoR (16) 66
3.	BEREC Opinion on Phase II investigation pursuant to Article 7a of Directive 2002/21/EC as amended by Directive 2009/140/EC: Case AT/2016/1846-1847	27 April 2016	29 April 2016	3 May 2016	4 May 2016	The BEREC Opinion approved by the BoR was published on the BEREC website under BoR (16) 83
4.	BEREC Opinion on Phase II investigation pursuant to Article 7a Case DE/2016/1854	13 June 2016	16 June 2016	withdrawn	Withdrawn	The case has been withdrawn by BNetzA
5.	The BEREC response to the Commission e-privacy questionnaire	21 July 2016	27 July 2016	28 July 2016	29 July 2016	The BEREC response to the Commission questionnaire was

No	Subject	Comments round		Voting round		Link to published document or other relevant information
		Start/link to docs	End	Start/link to docs	End/link to record	
						published on BEREC website under BoR (16) 133
6.	BEREC Opinion on Phase II investigation pursuant to Article 7a Case IT/2016/1885	30 August 2016	1 September 2016	5 September 2016	6 September 2016	The BEREC opinion approved by the BoR was published on the BEREC website under BoR (16) 150
7.	BEREC Opinion on Phase II investigation pursuant to Article 7a Cases PT/2016/1888-1889	1 September 2016	5 September 2016	7 September 2016	8 September 2016	The BEREC opinion approved by the BoR was published on the BEREC website under BoR (16) 154
8.	BEREC input to the European Commission regarding implementing acts setting out weighted average of maximum MTRs across the EU	22 September 2016	29 September , 2016	30 September, 2016	7 October 2016	The document was approved and is intended only to its addressees and is not available to the public.
9.	BEREC input to the European Commission implementing acts on FUP and sustainability of the abolition of retail roaming surcharges	7 October 2016	11 October 2016	12 October 2016	13 October 2016	The BEREC input approved by BoR was published on the BEREC website under BoR (16) 167

No	Subject	Comments round		Voting round		Link to published document or other relevant information
		Start/link to docs	End	Start/link to docs	End/link to record	
10.	Decision of the Board of Regulators on confirmatory application for access to documents No BoR (16) 192	2 November 2016	9 November 2016	10 November 2016	17 November 2016	The BoR decision was approved and published on BEREC website under BoR/2016/03

PART B: ANNUAL REPORT ON DEVELOPMENTS IN THE ELECTRONIC COMMUNICATIONS SECTOR IN 2016 – UNDER ARTICLE 3(1)(n) 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. Executive Summary

This BEREC report on sector developments presents the major trends in the electronic communications sector, addressing both market dynamics as well as the development of EU public policies and regulatory practices. Although, the report is mainly based on the key findings of the BEREC EWGs in 2016, 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.

Distribution of market shares is one of the key indicators for analysing the levels of competition in telecommunications markets. In 2015 the worldwide market of electronic communications services already generated more than EUR 1 trillion total revenue. European operators shared about a quarter of this total revenue. Innovative and advanced services, bundled offers and progressive solutions are constantly affecting the coexistence of competitors in fixed and mobile networks. The technological convergence of fixed and mobile networks is becoming a significant factor in the electronic communications landscape, which led to increased consolidation in certain parts of the electronic communications industry in 2016.

Key players in these activities were BT, EE, Hutchinson, H3G, WIND, Vodafone and Liberty Global as well as TDC Sweden and Tele2. Most of the mergers were subject to a number of commitments in order to maintain an effective level of competition, while some of them were also reviewed by the European Commission.

The European Commission has called for an approximate investment of EUR 50 billion per annum over the next 10 years, however, 2014 levels of investment in the sector were at the level of EUR 36 billion per annum. Based on the Commission's metric, for the twenty-six Member States that submitted data, the portion of revenues that European telecom operators spent on investment increased by approximately one percentage point over the 12 months to December 2014.

Penetration of fixed and broadband access continued to increase in EU countries in 2016. The total number of fixed broadband connections in the EU-28 increased by 5.9 million (3.7% YoY) to 166.6 million in July 2016. Total fixed broadband lines reached 32.7 per 100 inhabitants, a mean annual growth rate of 5.1% over the past 5 years.

Due to the increasing number of people that are accessing the internet using a mobile device connected to a mobile phone, mobile broadband represents the fastest growing segment of the broadband market. In July 2016, almost 84% of EU-28 inhabitants used mobile broadband, 8% more than 1 year earlier and up from 49% 4 years ago.

Over the last decade, bundling of telecommunications services as a marketing and sales strategy has become increasingly common. The rapid technological development in the telecommunications industry, notably the higher broadband speeds and convergence over the IP, has allowed for the emergence of bundles that include voice, data and television services.

Consolidation through mergers and acquisitions has continued in the European electronic communications services (ECS) markets in 2016. The EU telecoms market has also witnessed some significant cross-network consolidation in 2016. In addition, MNOs are increasingly relying on fixed broadband networks to offload their data traffic. The focus on sectoral regulation, and the sufficiency of the current regulatory model to cope with new market structures (in particular with oligopolies), is one of the topics that the revision of the existing legislative framework will need to address. The impact of increasingly oligopolistic market structures will also have to be considered by NRAs as they undertake their ex-ante market analysis.

BEREC continued its work on the impact of OTT services on the electronic communications sector both in terms of competition and consumer protection, also taking into account the application of the current EU regulatory framework for electronic communications and relevant needs for its adaptation. In its 2016 OTT report, BEREC encourages the pursuit of more convergent rules and legal definitions that would empower NRAs in addressing consumer protection and competition issues arising from interactions between ECS and OTT services.

With regard to the issue of net neutrality, the TSM Regulation was published in the Official Journal in November 2015, and the European net neutrality rules apply from 30 April 2016. The consistent application of the rules is supported by Guidelines issued by BEREC on 30 August 2016, providing guidance on the implementation of the obligations of NRAs related to the supervision, enforcement and transparency measures for ensuring open internet access. BEREC will continue monitoring the implementation of the net neutrality provisions of Regulation (EU) 2015/2120 in the context of the BEREC Guidelines in 2017.

Over the last 5 years, Member States have been assigning growing importance to NGA rollout. Overall, NGA coverage in the EU increased significantly from 48% end of 2011 to 71% by mid-2015. While Member States share the main goals of higher NGA coverage and penetration, the current status of NGA rollout differs to a considerable degree across them. Network related factors seem to be a very important driver of the type and extent of NGA rollout.

The international roaming benchmark reports show a good level of compliance in all EEA countries with the provisions set out in the Roaming Regulation. The regulation has led to a constant reduction in the average EEA wholesale prices for intra-EEA roaming voice calls. At the wholesale level, the EEA average Eurotariff was 2.921 cents in Q2 2016 and 2.905 cents in Q3 2016 compared to a cap of 5 cents. The average EEA SMS price decreased to 0.919 cents in Q2 2016 and consequently to 0.868 cents in Q3 2016. The EEA average price for wholesale data fell to 0.961 cents per MB in Q2 2016 and 0.954 cents per MB in Q3 2016, compared to 1.812 cents and 1.690 cents in Q2 2015 and Q3 2015.

Following NRA interventions and the implementation of the Commission Recommendation on termination rates, the wholesale rates both for mobile and fixed interconnection have fallen significantly and still keep decreasing. On the contrary, in most EU countries, SMS services are not subject to a wholesale termination price regulation. Nevertheless, a substantial decrease of SMS termination rates is observed in the EU markets over the years. Wholesale interconnection rates for mobile telephony services (MTR) in Europe fell markedly between January 2004 and January 2017: the simple average fell from 14.08 to 1.10 cents per minute, while the weighted average fell from 14.47 to 0.97 cents per minute.

Compared to MTRs, the fall in fixed termination rates is smaller, as the level of tariffs has been significantly lower. As of 1 January 2017, the simple average of the lowest regulated FTR of incumbents at European level (all 37 countries) stands at 0.36 cents per minute. The lowest FTR simple average of European Union incumbents (EU-28) stands at 0.21 cents per minute.

The overall picture of the cost accounting methodologies is relatively stable in comparison to last year with just a small number of changes by NRAs since 2015. There are clear preferences for price control methods (cost orientation alone or in combination with price cap, but the overall picture is getting more differentiated), cost base (current cost accounting – CCA) and allocation methodologies (mainly long run incremental costs (LR(A)IC) with fully distributed costs (FDC) preferred only in a few markets). The degree of consistent application of methodologies continues to be high and accommodates the use of elements or parameters that reflect national circumstances.

2. 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. 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 the 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, mostly in 2016, paying particular attention to market and regulatory trends, OTT, NN and NGA regulatory 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 EWG activity, together with quantitative data, based on the two main periodic BEREC data collection exercises and on other public reporting documents.

3. Market trends

3.1 Economic context

According to the most recent data published by the European Commission³³, as part of its Digital Agenda Scoreboard report, the electronic communications sector in Europe was worth approximately EUR 300 billion at the end of 2014, down from EUR 309 billion at the end of 2013; a decline of 3% on the year.

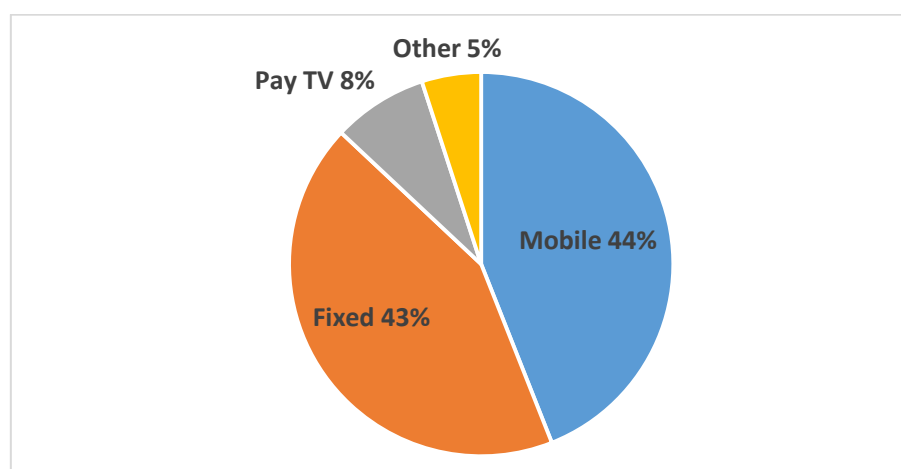
³³ <https://ec.europa.eu/digital-single-market/en/news/telecommunications-data-files-digital-scoreboard-2016>

More recent telecoms service revenue statistics for 2015, published by the European Telecommunications Network Operators' Association (ETNO)³⁴ in its Annual Economic Report 2016, suggests that the negative trend highlighted by the Commission's analysis (and indeed by more historical ETNO data) continued through 2015, with a further decrease in revenues of -1.2% for the telecom operators in the EU-28. However, ETNO also included a forecast for 2016 revenue growth in the report, which suggested that there would be a slightly positive uptick.

The data presented by the European Commission in August 2016 showed that in all but three of the EU-28 revenue growth was negative. Only Greece, Denmark, and Malta had positive revenue growth in their electronic communications sectors during 2014. The Italian and Spanish markets suffered revenue declines of approximately 7% in the same year.

Figure 1 below compares the revenue market share of the mobile, fixed and pay TV sectors at the end of 2014 at the overall European level. In general, at the individual Member State level, the picture is the same. However, there are a number of 'outliers'. For example, the revenue market share of the mobile sector in Hungary was 70% at the end of 2014, while mobile revenues in Austria accounted for 63% of the electronic communications sector. On the other hand, mobile revenue market shares in both Spain and Denmark were under 40% at the end of 2014.

Figure 1 – EU-28, electronic communications sector revenues in 2014



Source: European Commission

While it is clear from the data that over the last few years telecom operators have experienced a significant decline in their revenues overall, it is interesting to assess how that financial loss is being passed through to the consumer, if at all.

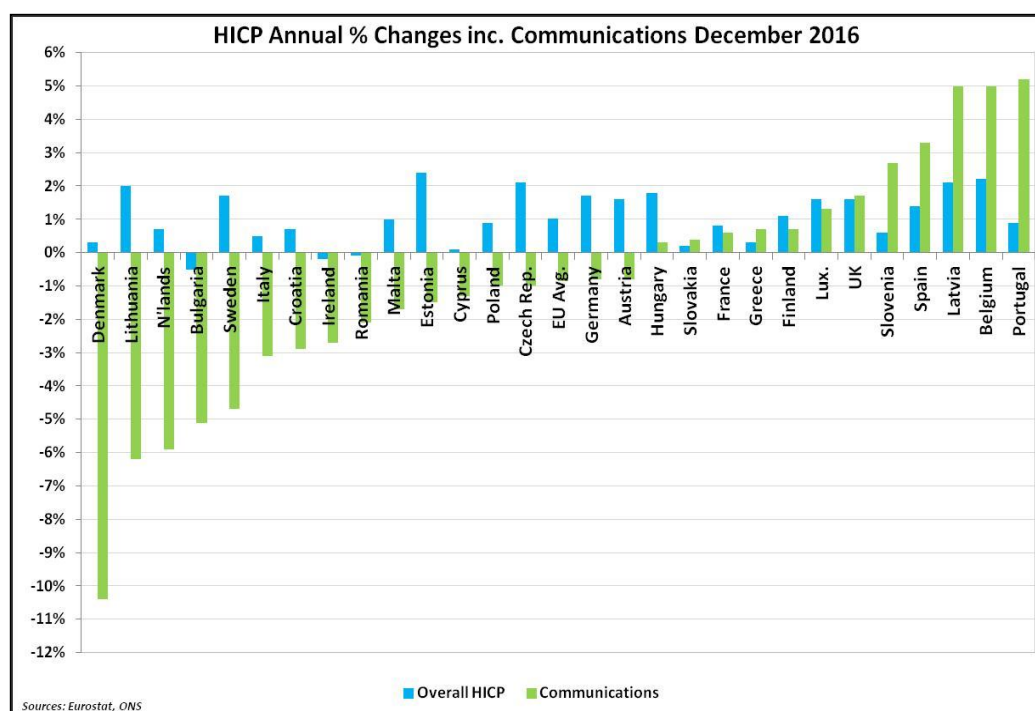
In the year to December 2016, based on data from Eurostat³⁵, while the overall harmonised index of consumer prices (HICP) for individual Member States was relatively stable, the communications sub-component for individual Member States varied significantly. Figure 2

³⁴ <https://etno.eu/datas/publications/annual-reports/ETNO%20AER2016%20FINAL.pdf>

³⁵ <http://ec.europa.eu/eurostat/web/hicp/data/database>

below shows that the communications sub-component (the cost of a basket of communications products including postal services) in sixteen Member States fell in the year to December 2016, most notably in Denmark (-10%), Lithuania (-6%), and Netherlands (-6%). Over that same 12-month period, the communications sub-component in twelve Member States increased, most notably in Portugal (+5%), Belgium (+5%), and Latvia (+5%). The average annual percentage change for the EU-28 Member States' communications sub-component decreased slightly over the year to December 2016.

Figure 2 – EU-28, annual % change in HICP and communications sub-component



Source: Eurostat, ONS

With falling revenues and price reductions (a very 'macro' perspective), it is clear that consumers are using more the services operators provide. Eurobarometer survey data³⁶, published in May 2016, shows not only the continuing shift away from more traditional communication technologies towards more innovative services, but also greater use of those more innovative services.

While 65% of respondents to the Eurobarometer survey live in a household with a fixed-line telephone, there is actually a large disparity in fixed-line access across the EU-28. Malta is the only country where at least nine out of ten have fixed-line access (93%), followed by 85% in Germany, Luxembourg and the Netherlands, 83% in Greece and 81% in France. In stark contrast, just 13% of respondents in Finland and 14% in the Czech Republic have access to a fixed-line telephone in their household. However as the next paragraph highlights, the disparity in fixed-line access is explained by developments on the mobile side as it seems that

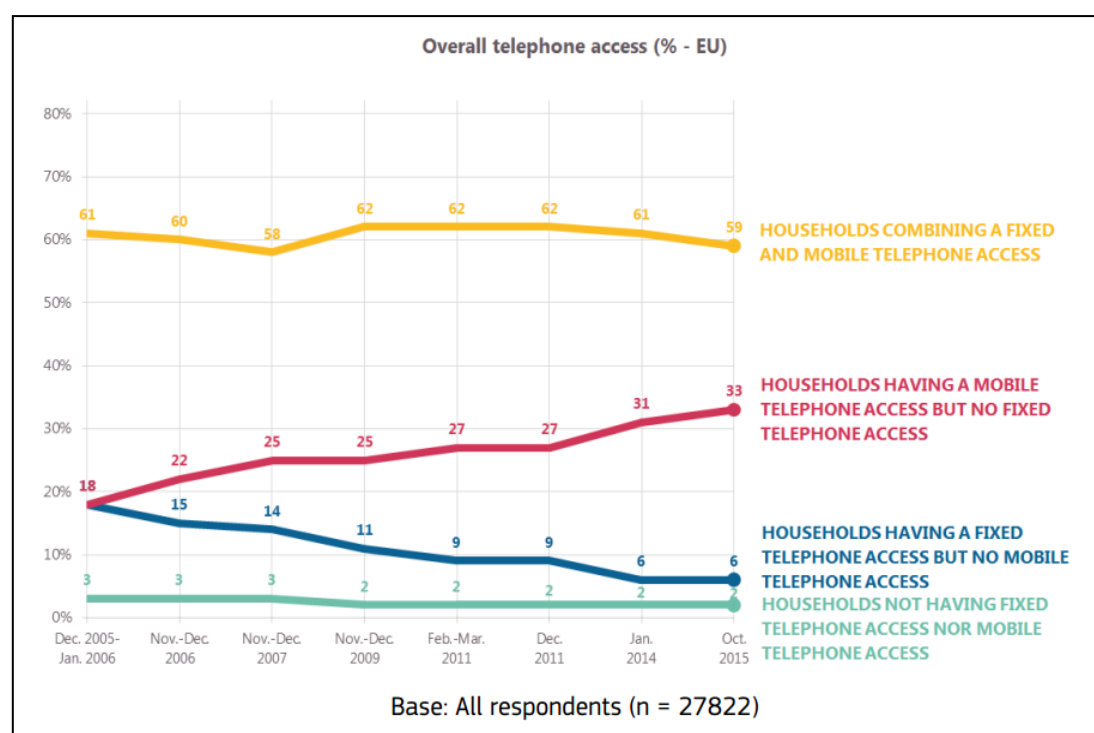
³⁶ E-Communications and the Digital Single Market, Eurobarometer, May 2016 (data as of October 2015).

a number of Member States are moving directly to mobile access (leapfrogging fixed-line access).

Mobile phone ownership is much higher than fixed-line telephone access; 93% of households have access to a mobile phone. Mobile access is almost universal in Finland and Sweden (both 99%), Denmark and the Netherlands (both 98%). In all but two Member States at least nine in ten respondents live in households with mobile phone access. The exceptions are Bulgaria and Greece (88% for each), but even there the level of mobile phone ownership is high. The trend is highlighted clearly in Figure 3 below.

Mobile internet access is present in at least nine out of ten households in Denmark (91%), the Netherlands and Sweden (both 90%). In fact, in all Member States at least six out of ten respondents live in this kind of household. Since 2014, the proportion of households with a mobile phone subscription or pre-paid service that includes internet access has increased in every Member State. For example, households with mobile internet have increased by 39 percentage points in Romania, 38 percentage points in Portugal, and 36 percentage points in Bulgaria. At the other end of the scale, the proportion of households with mobile internet increased by seven percentage points in the UK and eight in Latvia.

Figure 3 - Overall telephone access (% of all respondents in EU-28), May 2016



Source: Eurobarometer

As access continues to shift, so too does the type of usage. In most Member States fewer than 40% of consumers use their landline daily to make or receive calls. Respondents in Greece are the most likely to use their landline daily (69%), followed by 64% of those in Germany and 57% in Malta. At the other end of the scale, 4% of consumers in Finland, 6% in the Czech Republic and 8% in Latvia make or receive landline calls daily.

Furthermore, increasing numbers of consumers are utilising their (increasingly) preferred mode of communication (the mobile handset) for activities other than what would traditionally be considered communication in many cases. For example, respondents to the Eurobarometer survey are the most likely to have used at least one of the following paid online services in Sweden (69%), Denmark (60%), the UK (55%), and the Netherlands (50%):

1. online phone calls;
2. music services;
3. service for online access to movies or documentaries;
4. cloud service for storing content; and
5. service for accessing digital books or newspapers.

While the Commission and ETNO present a clear indication of what has happened to telecoms operator revenue over the last years, and Eurobarometer's survey data highlights how usage has shifted in the same period, it is just as relevant to observe how Average Revenue per User (ARPU) has changed recently.

According to a September 2016 report by Analysys Mason³⁷, fixed and mobile (voice and broadband for both) ARPUs, based on an average of the EU-28, have declined year-on-year since 2011. The Analysys Mason report indicates that the rate of decline in ARPUs slowed in 2015 but will nevertheless continue in the coming years. The effect of MTR cuts on voice revenue will dissipate and further regulatory measures are unlikely to have an equivalent impact. However, further cuts to roaming rates will affect countries dependent on tourism (such as Greece, Portugal and Spain).

The take-up of fixed-mobile converged bundles can be expected to have a slightly negative impact on short-term revenue, as discounts are the main incentive used to motivate early adopters to take up these bundles. However, discounts will eventually give way to other benefits, such as increased data allowances (a strategy employed by KPN, for example). Some markets, including France, Spain and the Netherlands, have already progressed beyond the discount stage.

3.2 Market players

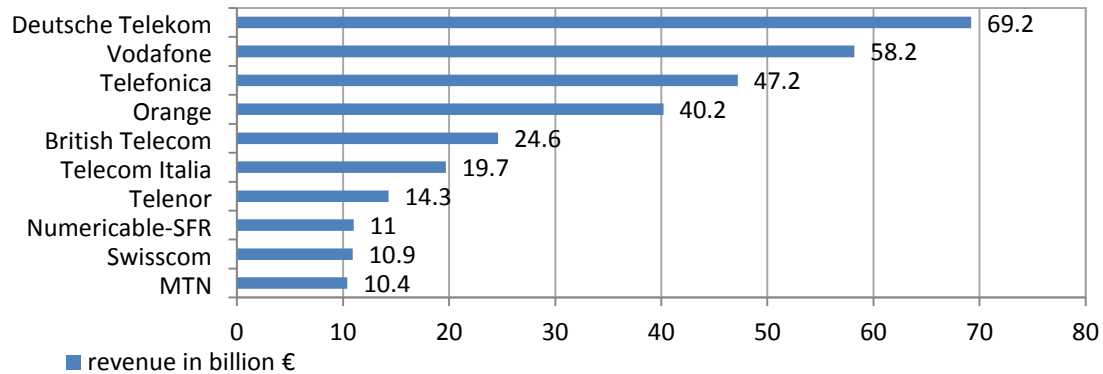
In 2015, the worldwide market of electronic communication services generated more than EUR 1 trillion total revenue. European operators share about a quarter of this total revenue. The distribution of market share is one of the key indicators for analysing the competition level in the electronic communications market³⁸. By the end of 2015, Deutsche Telecom had established a leadership position amongst telecom operators in Europe. With revenues exceeding EUR 69 billion, Deutsche Telecom is more than EUR 10 billion ahead of Vodafone (EUR 58 billion revenue) and more than EUR 20 billion ahead of Telefonica (EUR 47 billion revenue) and Orange (EUR 40 billion revenue). British Telecom is catching up with the top five, however its revenues, just under EUR 25 billion, are significantly lower compared to the

³⁷ Regional Forecast Report on the European Telecoms Market: Trends and Forecasts, Analysys Mason, September 2016.

³⁸ Global telecommunications services market value from 2012 to 2019. <https://www.statista.com/statistics/268636/telecommunications-services-revenue-since-2005-by-region/>

other four. Telecom operators outside the top five do not exceed revenues of EUR 20 billion, while operators outside top ten achieve less than EUR 10 billion revenue³⁹.

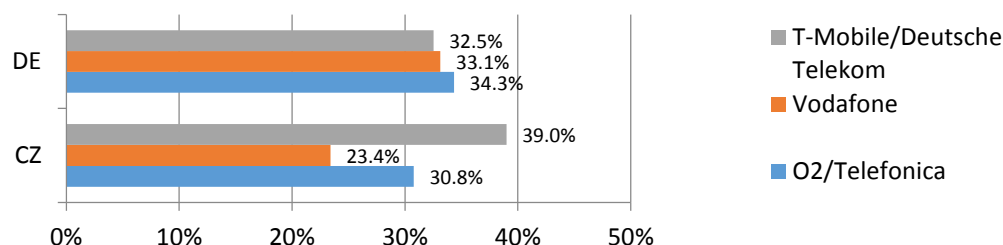
Figure 4 - Top ten European operators by revenue



Source: The Statistics Portal

Operators included in the top ten also hold substantial market share at a national level. Deutsche Telekom holds 54.6% market share of the German fixed network services, operating over 20 million fixed lines. Deutsche Telekom also holds 32.5% of the mobile market share in Germany and a significant mobile market share in more than five other European countries, often exceeding 20%. Vodafone is a direct competitor of Deutsche Telekom on fixed and mobile markets in Germany. Vodafone holds 20% of the fixed market share, and 33.1% of the mobile market share in Germany. However, Vodafone is also a prominent fixed and mobile operator in more than ten other European countries with its market share in those countries often exceeding 20%. Telefonica is a major operator of the fixed network in Spain holding a 52.3% market share. Telefonica as a mobile operator is also a prominent mobile operator in the UK and a direct competitor of Deutsche Telekom and Vodafone in Germany holding a 34.3% of the market share. These 'top three' European operators are also direct competitors in the Czech Republic mobile market, as highlighted in the chart below⁴⁰.

Figure 5 - 2016 market share



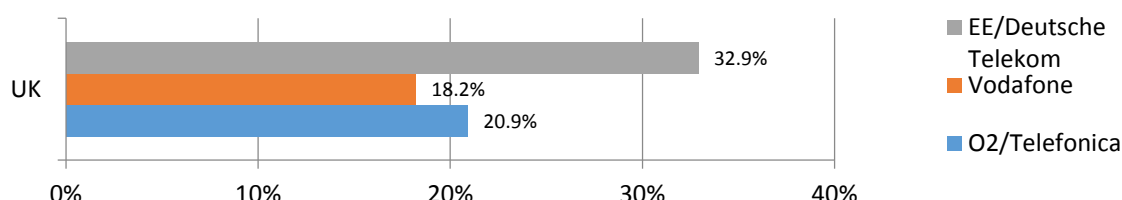
³⁹ The Statistics Portal Leading telecommunication operators in Europe by revenue in 2014. <https://www.statista.com/statistics/221386/revenue-of-top-20-european-telecommunication-operators/>

⁴⁰ http://berec.europa.eu/eng/document_register/subject_matter/berec/reports/6603-termination-rates-at-european-level-july-2016.

Source: BEREC Report - Termination rates at European level July 2016

These ‘top three’ European operators also previously competed directly in the United Kingdom mobile market, as highlighted in the chart below⁴¹.

Figure 6 - 2015 market share



Source: The Statistics Portal

In 2016, the United Kingdom’s mobile market experienced some considerable consolidation. After a process which lasted almost 1 year, BT finally completed the acquisition of EE – an operator originally founded by Orange and Deutsche Telecom as a joint venture⁴². Moreover, the European Commission investigated a merger between O2 UK (owned by Telefonica) that was to be purchased by Three UK (owned by Hutchison Whampoa) – an operator with considerable mobile market share at around 11%. However, this transaction was found to be incompatible with the internal market due to a significant impediment of effective competition in a substantial part of the internal market, through non-coordinated effects in the retail and wholesale market in the United Kingdom⁴³, and was blocked by the European Commission. Hutchinson was also engaged in a European Commission procedure concerning a joint venture between the two Italian operators H3G and WIND. Commitments offered by the parties were considered enough by the EC to ensure effective entry of a new fourth network operator in the Italian market and the operation was cleared in September 2016. This transaction raised concerns that it could lead to higher prices, less choice and reduced innovation for mobile customers in Italy⁴⁴. However, the commitments offered by the merged company were considered sufficient to ensure a sufficient level of competition in the market. The takeover was cleared in September 2016.

Another significant transaction concerns a joint venture by Vodafone and Liberty Global in the Netherlands. The approval of the Commission was subject to conditions obliging Vodafone to divest its consumer fixed-line business in the Netherlands⁴⁵. Liberty Global is also applied for approval from the European Commission to merge its subsidiary Telenet with BASE – one of

⁴¹ Market share held by mobile operators in the United Kingdom (UK) as of June 2015
<https://www.statista.com/statistics/375986/market-share-held-by-mobile-phone-operators-united-kingdom-uk/>

⁴² <https://www.gov.uk/cma-cases/bt-ee-merger-inquiry>

⁴³ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:C:2016:357:FULL&from=EN>

⁴⁴ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:C:2016:391:FULL&from=EN>

⁴⁵ http://europa.eu/rapid/press-release_IP-16-2711_en.htm

the three main mobile operators in Belgium. The operation was cleared conditioned to the divestiture of BASE's participation in Viking (an MVNO), transfer of BASE customers under the brand Jim Mobile to Medialaan (also an MVNO), and wholesale access for Medialaan to the BASE network⁴⁶.

The acquisition of telecommunications providers TDC Sweden by Tele2 has been cleared unconditionally by the European Commission due to mostly complementary activities of both companies. The Commission concluded that the transaction would therefore raise no competition concerns⁴⁷.

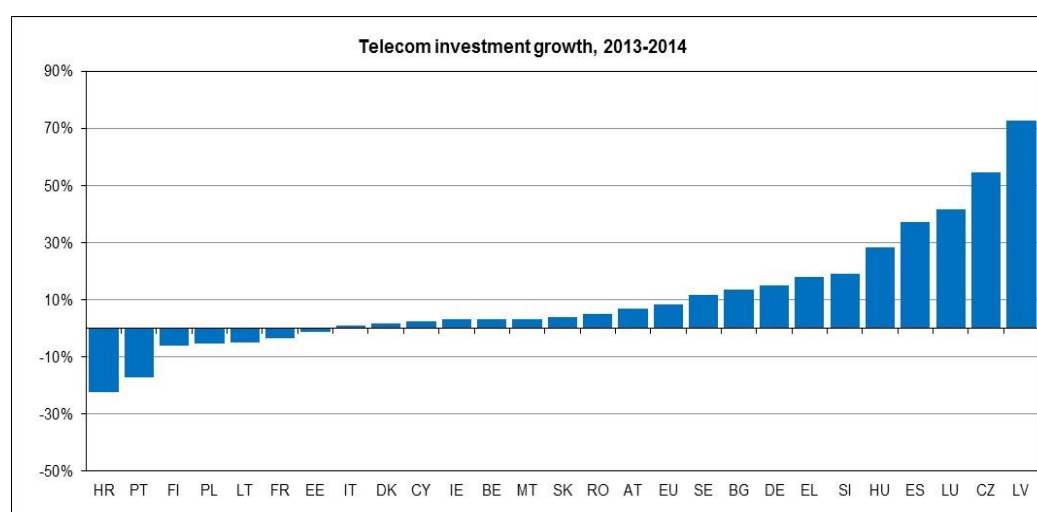
The examples highlighted show that the technological convergence of fixed and mobile networks is becoming a significant factor in the electronic communications landscape, which is leading to increased consolidation in certain parts of the electronic communications industry.

3.3 Investment

As the European Commission has called for an approximate investment of EUR 50 billion per annum over the next 10 years, it is appropriate to assess what are the current levels of investment in the sector in light of the preceding discussion. The Commission's recent data release on financial indicators⁴⁸ included the most up-to-date information on investment from the Member States as of 2014.

According to the data collected, total investment across twenty-six European countries⁴⁹ in the years 2013 and 2014 totalled, on average, EUR 36 billion per annum.

Figure 7 - Growth in investment by telecom operators, EU 26, 2013-2014



Source: European Commission

⁴⁶ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:C:2016:141:FULL&from=EN>

⁴⁷ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:C:2016:398:FULL&from=EN>

⁴⁸ <https://ec.europa.eu/digital-single-market/en/news/telecommunications-data-files-digital-scoreboard-2016>

⁴⁹ The United Kingdom and the Netherlands did not provide data.

In the year to December 2014, overall investment grew strongly in the 26 Member States that provided data; increasing by more than 8%. The individual Member States with the most significant increases in growth rates of investment in 2014 were Latvia (+72%), the Czech Republic (+55%), Luxembourg (+42%), and Spain (+37%), while investment growth in Croatia (-22%), Portugal (-17%), Finland (-6%), and Poland (-5%) was negative during the 12 months to December 2014.

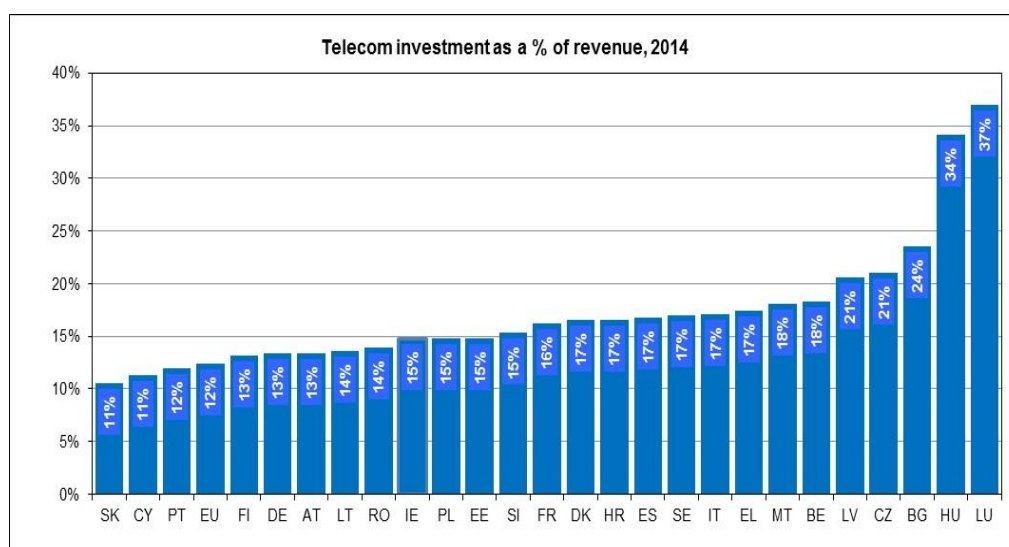
However, this investment growth data can be misleading of course as not all Member States are investing at the same absolute levels, and different Member States (and telecom operators) are simply at different stages in terms of their investment cycles. An alternative representation of the investment data collected by the European Commission is an assessment of the percentage of their (admittedly dwindling) revenues that telecom operators have spent for investment purposes.

Based on this metric, for the 26 Member States that submitted data to the European Commission, the portion of revenues that European telecom operators spent on investment increased by approximately one percentage point over the 12 months to December 2014. In 2013, overall there were 11% of revenues spent on investment by the 26 Member States that provided data, while in 2014 those same Member States spent 12% of revenues on investment.

As is evident from figure 8 below, Hungary and Luxembourg are clear outliers (on the high side) when it came to investment spend in 2014, while Slovakia, Cyprus and Portugal were slightly below the European (EU 26) average in that year.

Using the data collected, almost 72% of all investment in the 26 Member States that provided the relevant information, was spent in five countries combined; Spain, Germany, France, Poland and Italy, totalling almost EUR 27 billion in 2014.

Figure 8 - EU 26 investment as % of telecom operator revenue, 2014



Source: European Commission

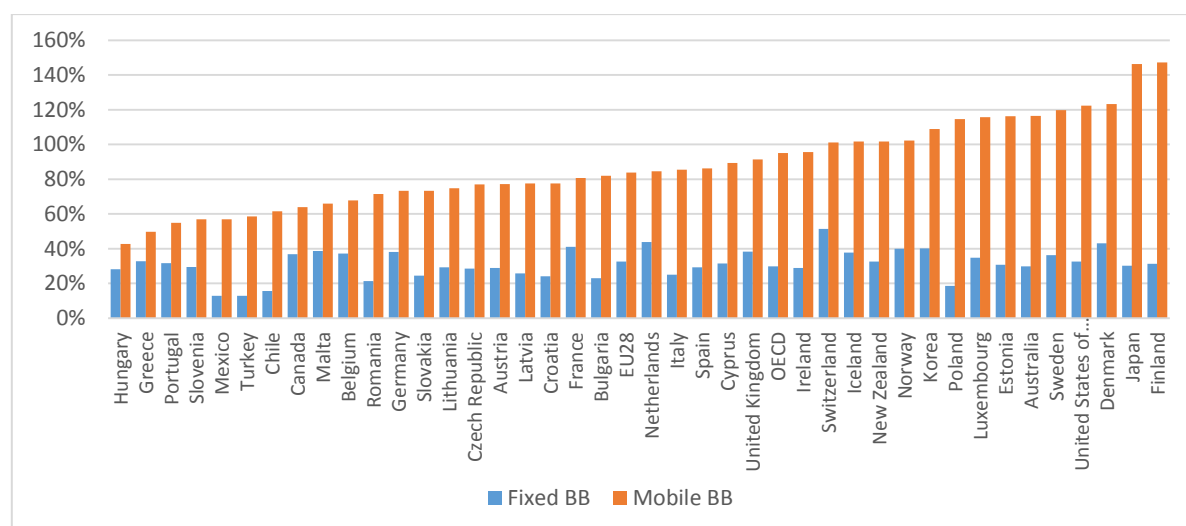
3.4 Broadband and next-generation take-up

Penetration of fixed and broadband access continued to increase in EU and OECD countries in 2016. The total number of fixed broadband connections in EU-28 increased by 5.9 million (3.7% YoY) to 166.6 million in July 2016. Total fixed broadband lines reached 32.7 per 100 inhabitants, a mean annual growth rate of 5.1% over the past 5 years, while OECD average is around 29.8 per 100 inhabitants. Within the EU-28, Netherlands, Denmark and France have the highest penetrations, well above the EU average, while Switzerland has the highest rate of OECD countries. Portugal, Greece and Malta together achieved the highest growth in 2016 (with a year-on-year increase of more than two percentage points).

Mobile broadband represents the faster growing segment of the broadband market. In July 2016, almost 84% of EU-28 inhabitants used mobile broadband, 8% more than 1 year earlier and up from 49% 4 years ago. Within EU-28, the Nordic countries, Poland, Estonia and Luxembourg there are more than 100 subscriptions per 100 inhabitants, while in Hungary and Greece the take-up rate is still below 50%. The OECD average is even higher, around 95.1%, driven by high penetration rates in the US, Japan, Australia, New Zealand, Korea.

This growth can be explained by the increasing number of people that are accessing the internet using a mobile device connected to a mobile phone. According to Eurostat⁵⁰, in 2016 in the EU-28, the proportion of individuals accessing the internet via a mobile phone reached 56%. At least eight out of ten individuals in Netherlands, United Kingdom, Sweden and Denmark use a mobile phone (or smartphone) to access the internet.

Figure 9 – Fixed and mobile broadband penetration (subscriptions per 100 inhabitants) in July 2016



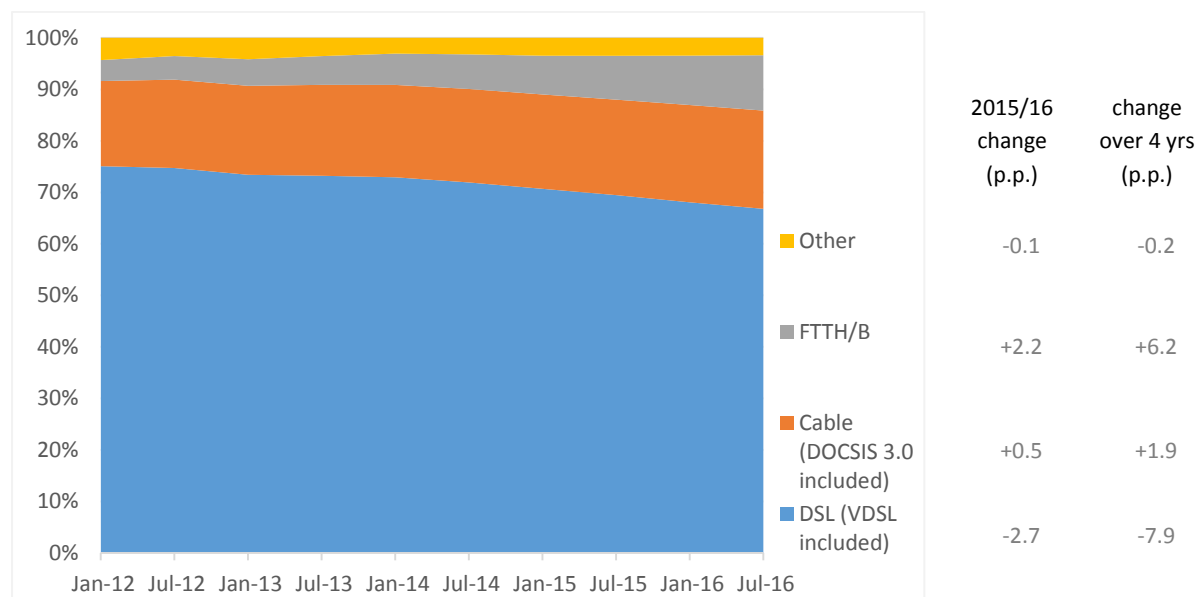
Source: European Commission and OECD

Note: Estimated data for Switzerland and United States.

⁵⁰ Eurostat, ICT usage in households and by individuals (2016).

The changing rate of fixed broadband penetration, broken down by technology, provides an interesting overview of developments between 2012 and 2016. DSL technologies remained dominant in the EU-28, although their share gradually declined (-7.9 percentage points over the 4-year period). The main reason for the decline in DSL lines is consumers migrating to NGA broadband services: FTTH/B made up around 10.7% of all connections in July 2016, up from 4.6% in July 2012 while cable continued to show steady growth from 17.2% in July 2012 to 19.1% in July 2016.

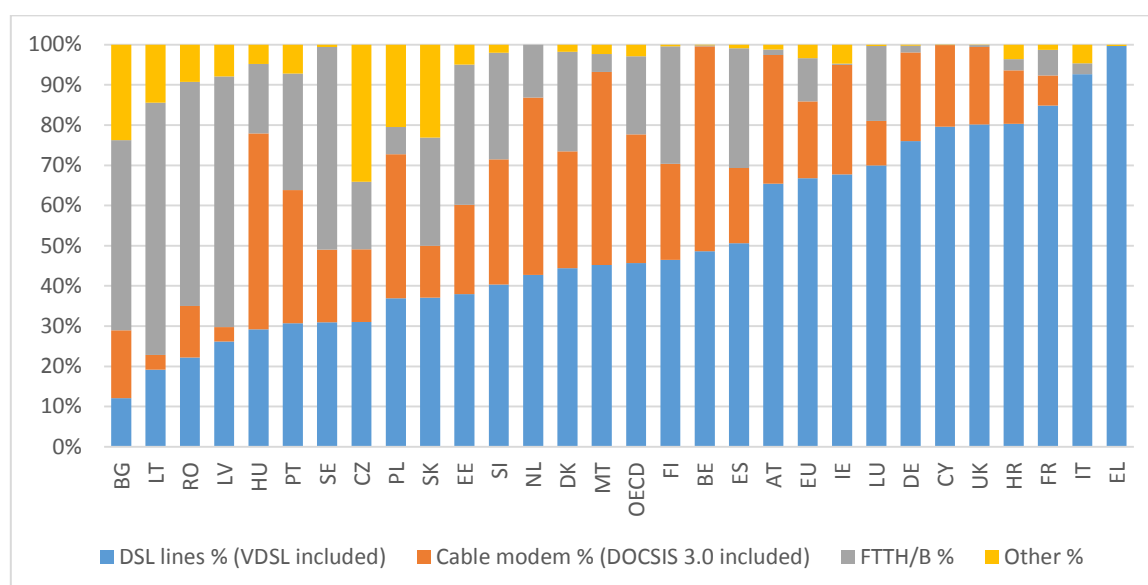
Figure 10 – Change in the share of broadband connections by technology in the EU



Source: European Commission

As shown in Figure 11, there are significant differences in the use of technologies across Europe. FTTH is the main access technology in Latvia, Lithuania, Bulgaria, Sweden and Romania while cable modem dominates in Belgium, Hungary, Netherlands and Malta. DSL technologies are still dominant in many countries like Greece, Italy or France. Overall, the main access technology in OECD countries in December 2015 is also DSL, although at a lower proportion than the EU figure. Fibre subscriptions represent 19% of total OECD fixed broadband subscriptions, well above the EU figure for the same technology at that time.

Figure 11 – Fixed broadband subscriptions by technology in July 2016



Source: European Commission and OECD

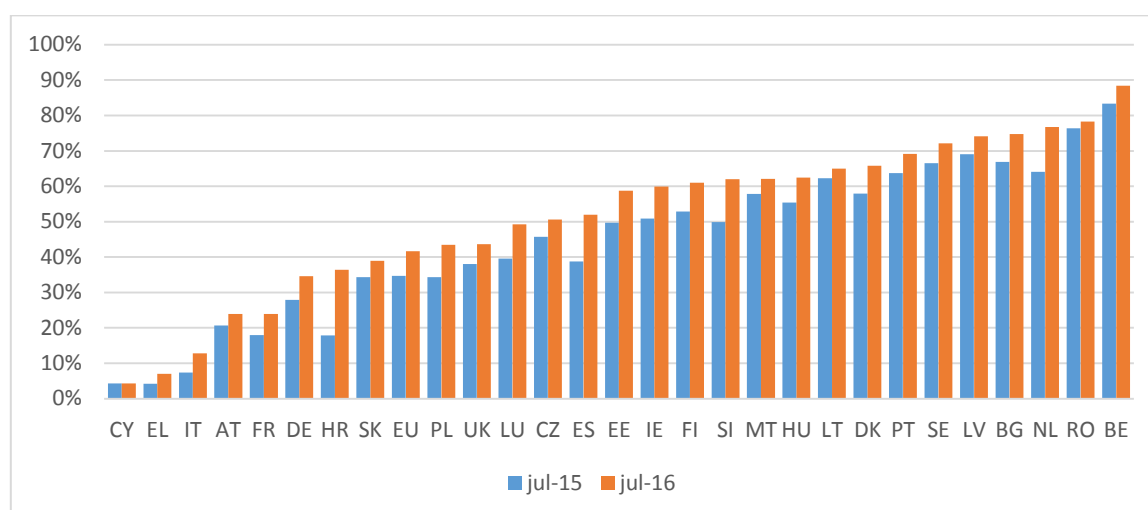
NB: OECD data is from December 2015.

NGA take-up also registered positive growth across the EU. Although the stock of fixed broadband lines (supported by all technologies) grew at an annual rate of 4%, in the period between July 2012 and July 2016, the demand for NGA subscriptions grew ten times more quickly, at an annual rate of 40%.

The penetration of NGA broadband connections rose by 6.9 percentage points in July 2016, equivalent to 42% of all broadband connections in the EU. Since July 2015, the largest increase has been observed amongst broadband subscribers in Croatia (+19 percentage points), followed by a 13 percentage point increase in Spain and the Netherlands.

Many of those NGA connections had been contracted as very-high-speed connections (i.e. connections providing actual speeds of at least 30Mbps). By July 2016, on average in the EU-28, 37% of broadband lines were at least 30 Mbps and 15% were at least 100Mbps.

Figure 12 - NGA take-up (as a % of total fixed broadband subscriptions), July 2015 and July 2016

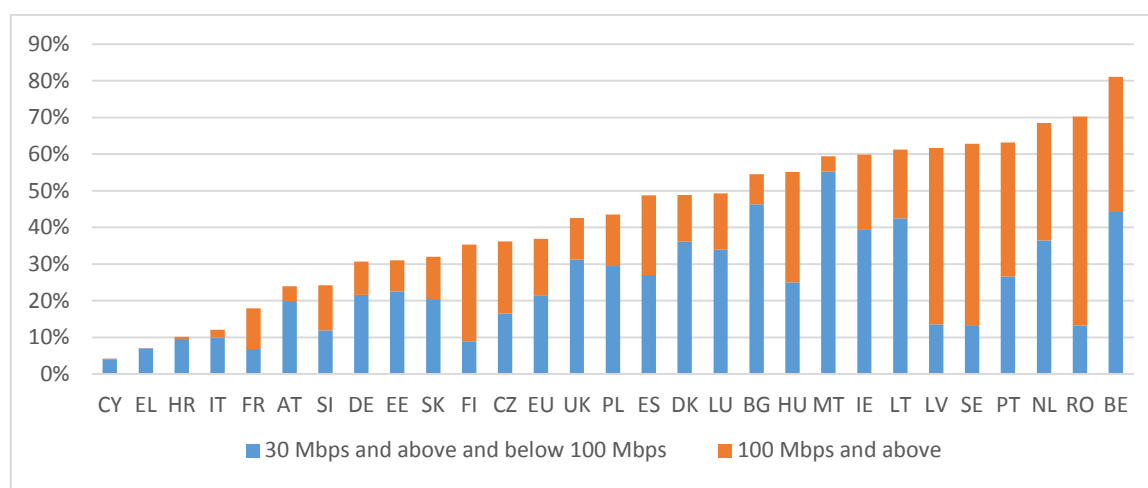


Source: European Commission

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

In Belgium, Romania, the Netherlands, Portugal, Sweden, Latvia and Lithuania, more than 60% are already at least 30 Mbps while less than 10% of subscriptions in Cyprus and Greece are at least that speed. In ultrafast broadband (at least 100 Mbps), Sweden and Romania are the most advanced with more than 50% of subscriptions.

Figure 13 - Fixed broadband subscriptions by speed



Source: European Commission

3.5 Mobile broadband

Traditionally telecommunication market has been a scene of struggle between fixed and mobile operators. Discourse between reliability and capabilities of wired technologies as oppose to convenience and efficiency of mobile connectivity remains unsettled ever since. Although mobile technology has its natural restrictions it has been keeping up with the

increasing bandwidth demand so far. Expanding coverage and ubiquity of mobile devices compensate most of the advantages of fixed broadband services.

A number of individuals connecting to the internet via portable devices has reached 2.5 billion at the end of 2015 and it is expected to increase by year 2020 up to 3.8 billion. This prognosis is far from satisfactory taking in to account that more than 40% of the world population in 2020 would still be excluded from the benefit of mobile broadband. Mobile broadband in the developed regions already accounts for more than 80% of connections and it is expected to increase up to 92%. Along with the increase of mobile broadband connections a progression of mobile technology is expected as 4G technology will become dominant in Europe accounting for 58% by 2020. Data consumption in Europe in 2015 for an average user was 1.8 GB per month and it is expected to increase by 2020 up to 12 GB of mobile data per month. Globally data transfer over a period of 2015-2020 is expected to increase by 49% resulting in an average data transfer of 7 GB per month, per user⁵¹.

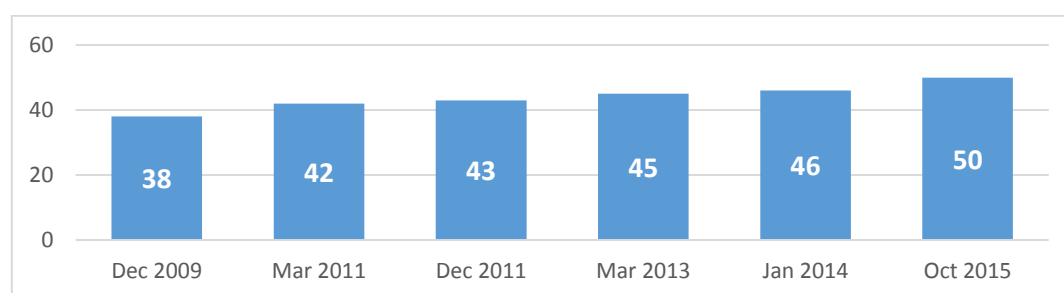
3.6 Bundles

Over the last decade, bundling of telecommunications services as a marketing and sales strategy has become increasingly common. The rapid technological development in the telecommunications industry, notably the higher broadband speeds and convergence over the IP, has allowed for the emergence of bundles that include voice, data and television services.

The bundling phenomenon has developed in various ways and bundle offers have become more and more frequent, slowly prevailing over standalone products. At the same time, bundles containing more ECS (3P, 4P) have started to catch up with 2P bundles. Operators perceive business advantages in concentration of their products, such as increased sales at reduced costs. As ECS enable access to desirable content and innovative functionalities, the inclusion of additional services in the offers together with ECS comes naturally as a next step on the way to maximise income by selling different services using the same sales channel.

In the last few years, with regard to bundles in ECS, the proportion of bundle users compared to stand-alone service users has been increasing.

Figure 14 - Bundle subscriptions incidence per 100 households (2009-2015)



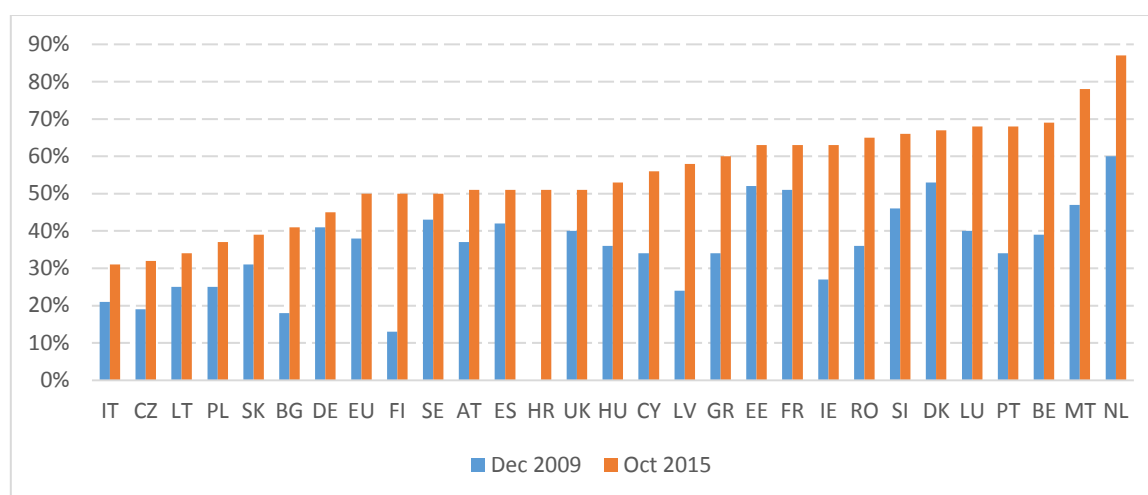
Source: Eurobarometer

⁵¹ GSM Association:

http://www.gsamobileeconomy.com/GSMA_Global_Mobile_Economy_Report_2015.pdf,

According to Eurobarometer⁵², the per-household proportion of bundled services has increased in Europe over the last number of years – up from 38% in 2009 to 50% in 2015. Growth is common to all countries, although at a different rate. For example, in the period from 2009 to 2015, according to Eurobarometer, the incidence of bundle subscriptions in Finland increased by 37 percentage points, while in Germany the incidence of bundle subscriptions increased by 4 percentage points. In October 2015, households in the Netherlands (87%) and Malta (78%) were the most likely to have subscribed to bundled services.

Figure 9 – Penetration of bundled offers (subscribers/households) per country (2009 and 2015)



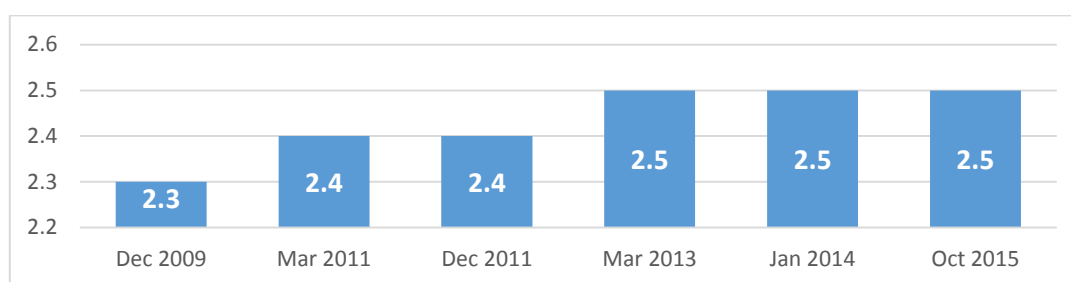
Source: Eurobarometer

There is also a large increase in the density of bundling, this means that more and more ECS are bundled and sold together (i.e. from double-play to triple-play to quadruple-play). Bundles of services have become more widespread in European countries due to fixed-mobile convergence and also considered due to the general improvement of broadband speeds. In 2009, the average density was 2.3 services per bundle and all of the five most common bundles were double-play (2P) offers⁵³. In 2015 the average density was 2.5 services per bundle and both triple-play (3P) offers and quadruple-play offers (4P) are among the five most common bundles.

⁵² Special Eurobarometer 438, E-Communications and the Digital Single Market.

⁵³ Calculation based on data from Special Eurobarometer 438 (page 73). From the figures on the chart, the average number of services in bundles can be calculated as follows: (2 services * percentage of 2P subscribers + 3 services * percentage of 3P subscribers + 4 services * percentage of 4P subscribers) / (percentage of 2P+3P+4P subscribers).

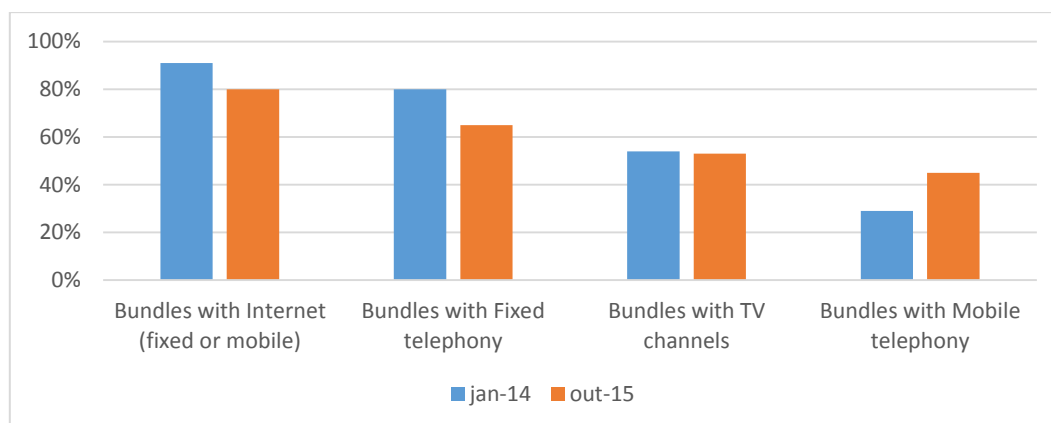
Figure 10 - Average number of services in bundle subscriptions (2009-2015)



Source: Eurobarometer

Internet access (mobile or fixed) was present in 80% of bundles, fixed telephony in 75% and TV in 53%. The percentage of bundled services that included mobile telephony increased from 29% in January 2014 to 45% in October 2015.

Figure 11 – Percentage of bundles including a different service



Source: Eurobarometer

According to the same survey, 22% of European households had a bundle with mobile as part of the package, representing an increase of ten percentage points since 2014 and reflecting the gradual convergence of mobile telephony and fixed services in the marketplace.

In addition, the electronic communications sector itself is moving towards a deeper integration with other types of services. This phenomenon also affects bundles, as other non-ECS are now included in the ECS bundles. Examples of such additional services include entertainment (e.g. music streaming, online gaming), social communication (e.g. instant messaging, social network) and software and data storage (e.g. antivirus, cloud application).

A study by Global Industry Analysts showed that mobile additional services (AS) revenues are forecasted to reach more than EUR 600 billion by 2018⁵⁴. This forecasted growth will be mainly driven by the increased use of smartphones, the development of mobile networks, the

⁵⁴ <http://www.callup.net/featured-products/value-added-services>.

increased adoption of mobile broadband and changing customer habits. Telecom operators are seeing a decline in the average revenue per user (ARPU) especially because of the drop in voice revenues and this is leading mobile operators to bundle more AS in their tariff plans in order to be more competitive, attract new customers as well as retaining their existing customers.

These AS are mainly incorporated as part of mobile services. This is described in a study delivered by Ovum⁵⁵ which showed that mobile services account for around 70% of these AS initiatives followed by fixed services and converged services, at just 15% each. The study points out that the growth of the bundle services will lead to an increase in converged AS since bundling will stimulate the further increase of access among multiple devices.

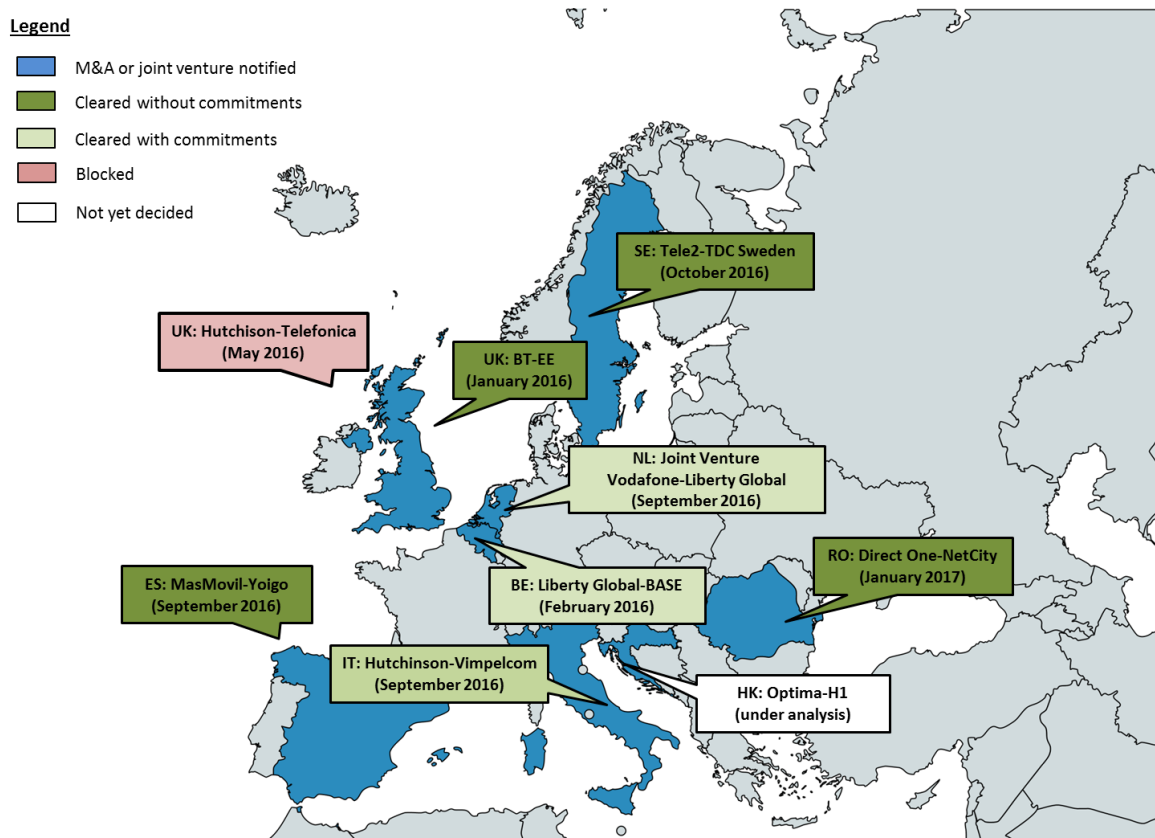
As consumers have started to see the benefit of these new services, there has been a growing interest in purchasing them jointly with traditional ECS, rather than purchasing them separately. Consequently, the importance of bundles is continuing to increase in the telecommunications industry, and revenues from bundled offers are a significant portion for many of Europe's main telecom providers.

4. Oligopoly analysis and regulation

Consolidation through mergers and acquisitions has continued in the European ECS markets in 2016. This consolidation process occurred primarily at the national level, and 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.

⁵⁵ 'Telco Services Innovation Radar 2015: Analysis and Case Studies', OVUM, 2015.

Figure 18 – Main mergers & acquisitions in the EU (2016)



Source: Based on publicly available information from various sources (EC and selected NCAs)

The trend towards more consolidation in national mobile markets slowed down in 2016. That year, just one merger between MNOs competing within the same country was cleared, with another blocked by the Commission.

In February 2016, Hutchinson Whampoa and VimpelCom (Wind Italy) notified the Commission of their plan to combine their Italian subsidiaries H3G Italy and Wind in a 50/50 joint venture. This joint venture would at first sight reduce the number of MNOs in Italy from four to three. However, the commitments offered by the resulting company to Iliad were considered sufficient to ensure the effective entry of a new fourth network operator in the Italian market and thus a sufficient level of competition in the market. These commitments included spectrum divestiture, the transfer of mobile base station sites and the provision of a national roaming service on a transitory basis. The takeover was cleared in September 2016.

In September 2015, Hutchison Whampoa also notified the Commission of its plans to acquire the sole control of O2, the mobile brand of Telefónica in the UK. As a result of this merger, the British mobile market would have three main MNOs instead of the current four operators. This is already the case in Germany, Ireland, Austria and Italy, where transactions reducing MNOs from four to three were approved by the Commission, subject to conditions. However, in this case, the Commission had serious concerns that the merger would lead to higher prices and reduced quality for consumers, and that it would hamper the development of network infrastructure and threatened the competitive capacity of the existing mobile virtual network operators (MVNOs) relying on the three remaining MNOs. The commitments offered by

Hutchison were not considered to be sufficient to clear the Commission's competition concerns. As a result, the merger was finally blocked by the Commission in May 2016⁵⁶.

In September 2016, the European Commission received a notification regarding the acquisition of TDC Sweden by Tele2 (MVNO providing mobile voice and other services in the business services market segment). The operation was unconditionally cleared by the European Commission in October 2016 due to mostly complementary activities of both companies⁵⁷.

During 2016, the EU telecoms market has also witnessed some significant cross-network consolidation. Such consolidation has the effect of allowing operators to (i) meet the growing consumer demand for service bundles, (ii) boost the revenues per user, and (iii) improve consumer loyalty. In addition, MNOs are increasingly relying on fixed broadband networks to offload their data traffic.

In October 2015, the Commission opened an in-depth investigation into the proposed acquisition of BASE (one of the three MNOs in Belgium) by Liberty Global (using the brand Telenet in the fixed market)⁵⁸. The Commission's concerns were twofold and related to: (i) the reduction of competition in the retail mobile telephony market in Belgium, where Liberty Global (Telenet) and BASE competed, and (ii) the lower incentives for BASE to offer MVNOs with access to its mobile network. The operation was cleared in February 2016, conditional on the divestiture of (i) BASE's participation in Viking (an MVNO using BASE's network) and (ii) BASE's customers for mobile services under the brand JIM Mobile in favour of Medialaan. The commitments also included providing Medialaan with access to BASE's mobile network under conditions that allow the former to effectively compete as a full MVNO.

In the Netherlands, following the 2014 consolidation in the fixed market⁵⁹, in August 2016 Vodafone and Liberty Global notified their intention to enter into a joint venture to market integrated fixed/mobile communications services. The Commission had concerns that the merger, as initially notified, would reduce competition in the market for fixed multiple play services and for fixed-mobile multiple play services in the Netherlands. The operation was cleared in September 2016 subject to Vodafone's commitment to divest its Dutch retail consumer fixed-line business. In December 2016, T-Mobile agreed to acquire that fixed-line business.

The ongoing transformation of the Spanish market through⁶⁰ continued with the acquisition of Yoigo (the fourth mobile network operator, owned by TeliaSonera) by Mas Móvil (former MVNO covering around 700,000 households with its own FTTH infrastructure and using also Orange fiber access) in September 2016, cleared without commitments. As a result of this transaction Mas Móvil is actually the fourth integrated operator in Spain competing with Telefónica, Orange and Vodafone which also own both fixed and mobile infrastructures.

⁵⁶ Case M.7612 Hutchison 3G UK/Telefónica UK

⁵⁷ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:C:2016:398:FULL&from=EN>

⁵⁸ Case M.7637 Liberty Global/BASE Belgium

⁵⁹ Acquisition of Ziggo by Liberty Global (see case M.7000 Liberty Global/Ziggo)

⁶⁰ Telefonica acquired DTS, the main pay TV satellite operator as well as owner of rights for key premium contents, Vodafone acquired ONO, the main cable operator in July, 2014 and Orange acquired Jazztel, the main alternative operator on fixed broadband.

British Telecom, in the United Kingdom, notified in May 2015 its intention to acquire Everything Everywhere, the largest mobile operator in the UK⁶¹. The acquisition was cleared unconditionally by the CMA (the Competition and Markets Authority in the UK) in January 2016. This is a good example of a transaction where a fixed operator aims to develop into an integrated operator providing fixed and mobile over its own infrastructures.

Finally, by the end of 2016, two additional mergers and acquisitions concerning fixed market and infrastructure consolidation were notified. In January 2017, the Romanian national competition authority cleared the takeover of Netcity Telecom (a provider of passive infrastructure and dark fibre in Bucharest) by Direct One (a nationwide fibre operator offering inter-city dark fibre, high-capacity leased lines and wholesale access for internet). In October 2016, Optima notified its intention to acquire its competitor H1 in Croatia. Both companies are active in the markets for fixed telecommunications (voice, internet and TV). The Croatian Competition Authority raised concerns about the potential impact on competition in both the wholesale and retail markets for the provision of fixed electronic communication services, and considerations are ongoing as this report is being prepared.

The impact of this concentration trend on sectoral regulation, and the sufficiency (or otherwise) of the current regulatory model to cope with new market structures, and in particular with oligopolies, is one of the topics that the revision of the existing legislative framework will need to address. This has led to an ongoing work by BEREC in this field (see section 2.1.8). At a national level, the impact of increasingly oligopolistic market structures will also have to be considered in by NRAs as they undertake their *ex ante* market analysis.

5. OTT services report

Following the investigation launched back in 2015, at its 26th plenary meeting on 25 February 2016, BEREC adopted a report which analyses OTT services and their relationship with ECS and provides a definition of the phenomenon. The report considers the impact of OTT services on the electronic communications sector, both in terms of competition and consumer protection, and in terms of application of the current EU regulatory framework for electronic communications and how this needs to be adapted. The report describes the internet value chain, provides the definition of ECS and OTT services and outlines a taxonomy for the latter. The paper introduces a differentiation within OTT services:

1. OTT services that potentially compete with ECS. The report describes the current regulatory approaches to OTT services, especially OTT voice and text services, and it addresses the issue of difference in regulation between ECSs and potentially competing OTT services.
2. OTT services that do not potentially compete with ECS. First, the report considers the impact that these OTT services may have on ECS providers. Second, the impact of the regulatory framework on these OTT services is considered.

The report also touches upon the partnerships between ECS and OTT providers by giving a general overview of these partnerships in Europe, identifying the possible incentives that drive

⁶¹ Case ME/6519-15 BT / EE

them, assessing the impact of them on competition and consumers, and describing their legal limits.

Furthermore, the report deals with the central theme of the differences in the regulatory treatment of ECS and OTT services. In this respect, BEREC notes that, although there is general appreciation of the idea that services of the same type should preferably be subject to broadly the same regulatory treatment, there can also be reasons for different regulatory treatment of services. The range of services to which any specific obligation should apply, must therefore be considered in light of the goals of the obligation at stake and its proportionality.

The report concludes that, due to the current and expected development of new online services, the boundary between ECSs and the content services provided over electronic communication networks (these latter out of the scope of the Regulatory Framework) will become more blurred. The report therefore recommends clarifying or reconsidering the definition of ECS in order to ensure that it keeps pace with current technological developments, is future proof and is still the proper foundation to determine which services are regulated under the Framework.

In its report, BEREC encourages the pursuit of more convergent rules and legal definitions to empower NRAs to address consumer protection and competition issues arising from interaction between ECS and OTT services. BEREC also suggests extending NRAs' powers of information collection beyond ECN/S providers, so that regulators have all the necessary information for their market analysis responsibilities.

6. Developments related to European net neutrality regulation

The TSM Regulation was published in Official Journal in November 2015, and the European net neutrality rules apply from 30 April 2016. The consistent application of the rules is supported by guidelines issued by BEREC on 30 August 2016, providing guidance on the implementation of the obligations of NRAs related to the supervision, enforcement and transparency measures for ensuring open internet access.

The time duration for the application of the net neutrality rules is too short to contribute any analysis of the developments in the market, but in 2017 BEREC will continue monitoring the implementation of the net neutrality provisions of Regulation (EU) 2015/2120 in the context of BEREC Guidelines. BEREC will then produce a report describing and analysing how NRAs have implemented the rules and issues which arose.

7. Emerging challenges in next generation networks and IP-interconnection

In Europe, there is a broad consensus among all parties (the European Commission, national and regional governments, regulatory agencies, communication providers) that the rollout of NGA networks is a desirable and highly important goal. This goal is also mirrored in the Commission's proposal for the EECC attaching great importance to investment in high-capacity networks.

The facts and observations laid out in this section may contribute to informing the current debate on the DSM review.

Over the last 5 years, Member States have been assigning growing importance to NGA rollout, and overall NGA coverage⁶² in the EU increased significantly from 48% at the end of 2011 to 71% by mid-2015. While Member States share the main goals of higher NGA coverage and penetration, the current status of NGA rollout differs considerably across the EU.

Differences can be explained by a number of categories of driving factors – largely exogenous to the NRAs' sector-specific regulation, namely infrastructure competition (mostly from DOCSIS 3.0 but also from alternative operators FTTP deployment), demand side factors (i.e. demand for services requiring high bandwidths and a high willingness to pay a premium for NGA-based access) and supply side factors (i.e. factors which influence the costs or the quality of NGA-deployment, including factors which more indirectly influence cost or quality such as public policy). The analysis shows that in many countries the type of NGA rollout is considerably shaped by the legacy infrastructure and existing civil engineering infrastructure, hence revealing strong elements of path dependency.

Focusing on the supply side, a network-related factor that significantly lowers the costs of NGA deployment and particularly FTTP deployment is the availability of high-quality ducts in the access network. In particular in the last segment of the access network connecting street cabinets/aggregation points⁶³ and customer premises, high-quality ducts are only available in a small number of countries. Such ducts can be used to roll out fibre without any additional civil engineering infrastructure works, which saves around 70-80% of deployment costs.^{64,65} Therefore, in countries such as Spain, France, Portugal and Lithuania where ducts are widely available the (future-proof) FTTP rollout is usually preferred to an FTTC rollout. In some countries, ducts from other infrastructures are used as well – either by the infrastructure owners themselves (often the case for local utilities, e. g. in Sweden and Switzerland) or through sharing or co-investment agreements between infrastructure owners and telecommunication network operators (e. g. co-investment in Switzerland).

Conversely, where the quality and/or availability of ducts in the access network infrastructure is not high, (e. g. Belgium, Denmark, Italy, Malta, Austria and the United Kingdom) there is considerably less deployment of FTTP using the incumbent's access network and a much greater reliance on copper technologies (FTTC/VDSL). Duct quality/availability can also vary across a country thus leading to different deployment strategies within a country: In Bulgaria and Finland, NGA rollout is progressing fastest in the large cities – the areas in the two countries where ducts are available. Yet the availability of ducts is not a necessary condition for FTTP rollout, one example being the Netherlands.. There, rollout of FTTP technologies

⁶² Sources: Commission (2016) Digital Economy and Society Index 2016 Telecommunications data files and Commission (2013, Commission (2014), Commission (2015) Commission studies on broadband coverage. The Commission distinguishes three categories of broadband, namely 'standard broadband' which includes all fixed and mobile broadband technologies but excludes satellite, 'standard fixed broadband' which captures coverage provided by fixed technologies and 'NGA broadband' which covers the technologies VDSL over copper, FTTP (comprising both fibre to the home (FTTH) and fibre to the building (FTTB)) and cable DOCSIS 3.0. Technologies which come under this very last category are chosen such that they are able to meet the DAE's 2020 objective of providing 30 Mbps to every household. Coverage is understood to be the percentage of households covered by NGA infrastructure.

⁶³ In some Member States there are no street cabinets (e. g. Spain).

⁶⁴ Communication from the Commission on the EU Guidelines for the application of state aid rules in relation to the rapid deployment of broadband networks (2013/C 25/01), footnote 42.

⁶⁵ PT's incumbent operator reports figures as low as EUR 100 per home passed (FTTH-GPON), cp. <http://www.totaltele.com/view.aspx?ID=493077>.

takes place in (sub)urban and rural areas even in the absence of such ducts. Surface conditions are a key facilitating factor as they lead to lower civil infrastructure costs compared to other countries.

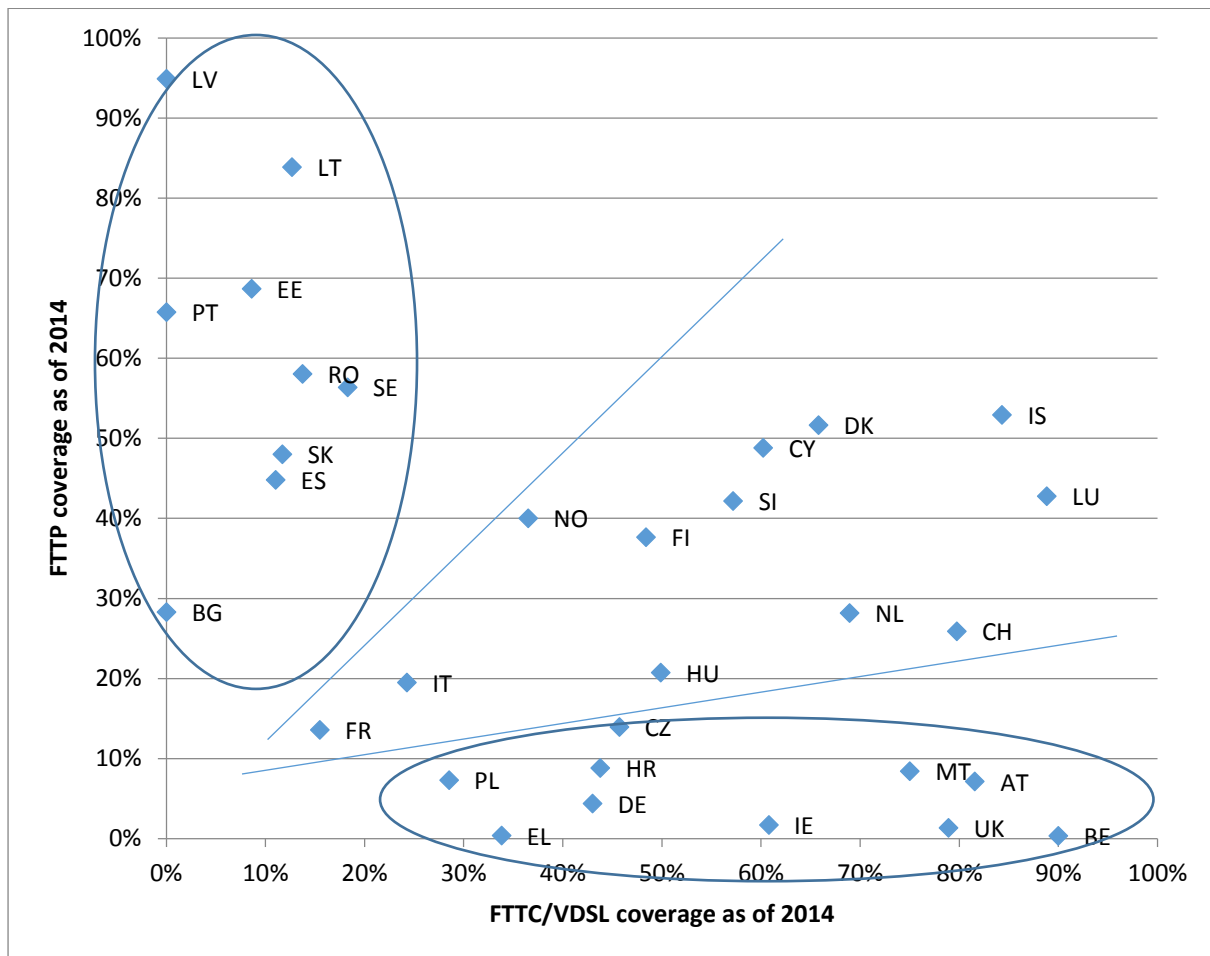
The quality of the copper network can also determine the choice of technology for NGA deployment. In some Member States, the copper network is such that it is well suited for the rollout of FTTC. This includes cases such as Belgium, Denmark, Germany, Italy, Malta, Austria and the United Kingdom where the network architecture incorporates street cabinets and in which the quality of the copper network between street cabinets and premises is good and the sub-loops are not too long (for VDSL deployment). In such circumstances, incumbent operators (and in some cases also alternative operators) are primarily investing in FTTC since this involves much lower costs per customer compared to FTTP (usually some four to five times less). FTTC deployment can also be done much more quickly as it involves much less civil engineering work. This reduces time to market which is also an important factor in competition for high bandwidths, in particular if there is infrastructure-based competition.

However, the quality of the copper network does not always lend itself to an FTTC upgrade path. In a number of Member States, the upgrade path to FTTC is not available due to the design and nature of the legacy network architecture. Examples are Lithuania where the quality of the copper cables is relatively poor, Croatia, where no street cabinets exist, or Sweden where the local loops or sub-loops are relatively long. In countries like Romania and Bulgaria, there is only a rudimentary developed (legacy) copper network available, favouring the move to FTTP.

Operators which have chosen FTTC are increasingly asking NRAs for permission to apply technologies such as VDSL Vectoring or – on very short access lines – G.fast. These technologies offer higher speeds but they require operator exclusivity.⁶⁶ This is relevant for the regulatory approaches applied in such situations (see section 3 on NGA rollout and regulation). Countries with regulation on Vectoring include Denmark, Germany, Italy, the Netherlands and Austria. The bandwidths which can be achieved with such technologies are often below those offered with FTTP or cable networks, but are considered sufficient by the operators employing such technologies to meet the demand of most customers in those countries in the short to medium run. However, in the long run, it is likely that it will be necessary to further upgrade such networks to FTTP.

⁶⁶ While multi-operator vectoring is technically feasible, its implementation is facing practical challenges. Multi-operator vectoring which enables the operators involved to use DSLAMs from different vendors is currently not available because the interface between the DSLAMs has not yet been standardised. Even if operators use DSLAMs from the same vendor, multi-operator vectoring needs a high-level of coordination among them (see AGCOM decision No 747/13/CONS and BoR (16) 162, Common Position on Layer 2 Wholesale Access Products, 6 October 2016).

Figure 19: FTTP vs. FTTC/VDSL coverage as of 2014.



Source: BoR (16) 171 BEREC Report on NGA Challenges and Drivers, European Commission (2015)

Figure 19 shows the relationship between FTTP (which includes FTTH and FTTB) and FTTC/VDSL-coverage in 31 European countries. Three groups can be identified:

- One group with primarily FTTP-investments (upper left). In most of these countries, the costs of rolling out FTTP are comparatively low and/or the copper network is less suited for FTTC/VDSL deployment. Demand (or the lack thereof) seems to play an important role as well.
- A second group with primarily FTTC-investments (lower right). In most of these countries the costs of FTTP are comparatively high due to the lack of availability of quality ducts in segments of the access network and the copper network is well suited for FTTC/VDSL deployment. This group also includes countries with a high prevailing cable coverage (Belgium, Germany, Malta, Switzerland). The need to upgrade copper networks relatively fast to higher speeds due to high competitiveness from cable probably has played a role in those countries as well.
- A third group in between with both significant FTTP and FTTC coverage. In such countries, depending on the specific geographic area observed, one of the two scenarios described above might prove relevant.

All in all, network related factors seem to be a very important driver of the type and extent of NGA rollout. Since network related factors are difficult to measure and to collect consistently across countries, they are usually neglected in empirical investigations. Although this is understandable from a practical point of view, it may lead to biased results ascribed to the other factors included in those investigations.

Taking a look at the approach regulators have used taking account of the factors identified the following observations hold:

Where ducts are available, access to this infrastructure incentivises alternative operators' as well as incumbent operator's fibre rollout. With the deployment of parallel fibre networks, regulation could be limited or reduced to duct access (Portugal, some areas of Spain) and with co-investment schemes, regulation could be limited to (symmetric) passive access and duct access (France). Where no ducts are available, rollout costs are significantly higher. This typically leads to a situation where the incumbent owns the most extensive FTTP or FTTC network. In such cases, other access products like fibre unbundling or active wholesale access products are needed to promote competition. Investment incentives are taken into account when the access price is set either based on costs or on some kind of margin squeeze test.

In line with the principle of technological neutrality, NRAs generally do not regulate to favour a particular type of technology. Given the importance of other factors influencing the technology choice, there would be the risk to promote a technology which is not the most efficient (at least in the short to medium run). Nonetheless, FTTP has been incentivised in some countries or areas where the rollout of several FTTP infrastructures could be observed or be reasonably expected by limiting access remedies to ducts and in-house cabling (Spain, Portugal).

Regarding the influence of regulation of the legacy copper access network on NGA investments, there are some countries where unbundling operators have started to invest in FTTP – mainly in cases where ducts and duct access are widely available (Spain, France, Portugal). These are examples of how alternative operators have used the ladder of investment to move up the ladder and deploy their own access infrastructure. In cases where operators aim to deploy VDSL Vectoring, copper unbundling requires the determination of fair rules for this deployment⁶⁷.

In such circumstances, active wholesale access products are used to allow the incumbent operator to deploy technologies which require exclusivity such as VDSL Vectoring or G.fast and at the same time maintain effective competition at the retail level (e.g. Denmark, Austria, United Kingdom). Where alternative operators have also invested (or are investing) in FTTC (based on sub-loop unbundling), this has been addressed by vectoring regulations to allow several operators to invest.

⁶⁷ This is true if there is a large number of operators using the full LLU since those operators, once one single operator gets permission for applying Vectoring, will usually not be able to compete with that operator in terms of bandwidths anymore. It applies even more in cases where there is alternative operators making use of SLU and being possibly interested in deploying Vectoring themselves.

8. International roaming developments

On 27 October 2015, the European Parliament (EP) adopted the Regulation for a European Single Market for Electronic Communications (TSM Regulation), abolishing retail roaming charges in order to allow customers to “Roam Like at Home” (RLAH) with a fair use limit.

Regulation (EU) No. 2015/2120⁶⁸, published in the Official Journal of 26 November 2015, includes amendments to Roaming Regulation No. 531/2012⁶⁹, in particular the principle of Roam-Like-At-Home, i.e. requiring roaming providers not to levy any surcharge in addition to the domestic retail price on roaming customers as of 15 June 2017 (RLAH tariffs). Notwithstanding this, the Roaming Regulation allows providers to add a surcharge for regulated roaming services in addition to the domestic price during the transitional period (30 April 2016 until 14 June 2017). Furthermore, roaming providers can also offer alternative roaming tariffs as an alternative to RLAH and RLAH+⁷⁰ and customers may choose those alternative tariffs.

Where a roaming provider applies a surcharge for the consumption of regulated retail roaming services, the sum of the domestic retail price and any surcharge applied must not exceed the price cap set out in Article 6e (1) (b). For calls received, which are not charged domestically, Article 6e (1) (c) provides that any surcharge applied shall not exceed the weighted average of the maximum mobile termination rates set out in the Implementing Act⁷¹. For calls made, SMS sent and data used, Article 6e (1) (a) provides that any surcharge must not exceed the wholesale caps, which are currently 5 cents per minute, 2 cents per SMS and 5 cents per MB respectively⁷².

In order to assess the competitive developments in the Union-wide roaming markets, BEREC has to regularly collect data from national regulatory authorities on the development of retail and wholesale charges for regulated voice, SMS and data roaming services. On the basis of the collected data, BEREC also has to report regularly on the evolution of pricing and consumption patterns in the Member States for both domestic and roaming services and the evolution of actual wholesale roaming rates for unbalanced traffic between roaming providers.

Due to the difficulties of allocating bundle revenues to individual service categories (ISCs), such as fixed telephony, mobile telephony, fixed broadband and others, BEREC examined the alternative of presenting data on the evolution of average retail revenue per user (ARRPU).

⁶⁸ Regulation (EU) 2015/2120 of the European Parliament and of the Council of 25 November 2015 laying down measures concerning open internet access and amending Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services and Regulation (EU) No 531/2012 on roaming on public mobile communications networks within the Union. <http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A32015R2120>

⁶⁹ Regulation (EU) No 531/2012 of the European Parliament and of the Council of 13 June 2012 on roaming on public mobile communications networks within the Union. <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32012R0531>

⁷⁰ RLAH + allows the roaming provider to apply a surcharge in addition to the domestic retail price during the transitional period (from 30 April 2016 until 14 June 2017)

⁷¹ Pursuant to Regulation (EU) No. 531/2012 the Commission is to review the weighted average of maximum mobile termination rates across the Union annually. Commission Implementing Regulation (EU) 2015/2352 of 16 December 2015 setting out the weighted average of maximum mobile termination rates across the Union http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2015.331.01.0007.01.ENG

⁷² These are applicable from 30 April 2016 to 14 June 2017.

However, in the context of the BoR (16) 33 BEREC Report on the wholesale roaming market⁷³, it was emphasized that the ARRPU depends on many parameters other than prices (volumes, handset subsidies, sensitivity to the number of active SIM cards, etc.) and is therefore quite a weak index for comparing domestic price levels. Further conclusions on price levels of mobile communications services can be made only by a thorough review of retail prices for mobile communications services.

The domestic monthly ARRPU for Q3 2016⁷⁴ varies considerably between the countries, ranging from EUR 1.286 per month to EUR 32.204 per month, with a weighted EEA average of EUR 8.697⁷⁵.

The regulation has led to a constant reduction in the average EEA wholesale prices for intra-EEA roaming voice calls. At the wholesale level, the EEA average Eurotariff was 2.921 cents in Q2 2016 and 2.905 cents in Q3 2016, compared to a cap of 5 cents per minute. BEREC also assessed the prices for balanced and unbalanced traffic. The EEA average wholesale price per minute for balanced traffic was 3.214 cents during Q2 2016 and 3.130 cents during Q3 2016. Meanwhile, the EEA average price per minute for unbalanced traffic was 2.748 cents during Q2 2016 and 2.841 cents during Q3 2016.

There have also been reductions in the average EEA SMS price to 0.919 cents in Q2 2016 and 0.868 cents in Q3 2016. In comparison, the EEA average price per SMS was 13.314 cents in Q2 2009, before the 2009 Regulation came into force. The average price per SMS for the balanced traffic was 1.099 cents in Q2 2016 and 1.102 cents in Q3 2016. Over the same time, the average price per SMS for the unbalanced traffic was 0.790 cents in Q2 2016 and 0.788 cents in Q3 2016.

The EEA average price for wholesale data fell to 0.961 cents per MB in Q2 2016 and 0.954 cents per MB in Q3 2016, compared to 1.812 cents and 1.690 Cents in Q2 2015 and Q3 2015. In the context of the wholesale inbound roaming costs, the EEA average cost of handling the balanced traffic was 1.259 cents per MB in Q2 2016 and 1.233 cents per MB in Q3 2016, whereas the EEA average price for handling the extra traffic was 0.869 cents per MB in Q2 2016 and 0.892 cents per MB in Q3 2016.

With regard to EEA volumes of voice, SMS and data roaming services, one particular issue stands out, which is the significant difference between the relative consumption patterns. While volumes for voice and SMS services have changed relatively little since 2012 to Q3

⁷³ BoR (16) 33 BEREC Report on the wholesale roaming market, 12 February 2016
http://berec.europa.eu/eng/document_register/subject_matter/berec/reports/5745-berec-report-on-the-wholesale-roaming-market

⁷⁴ The monthly ARRPU was calculated per country by dividing retail revenues in the respective quarters by the total number of domestic and roaming subscribers per country within the same period and further dividing by 3 (retail revenues were total revenues related to mobile voice, SMS and data traffic – any other type of revenue, such as those originating from mobile devices, subscription fees to services etc. are not included).

⁷⁵ Disparity between individual ARRPU could also be caused by different methodologies used by operators.

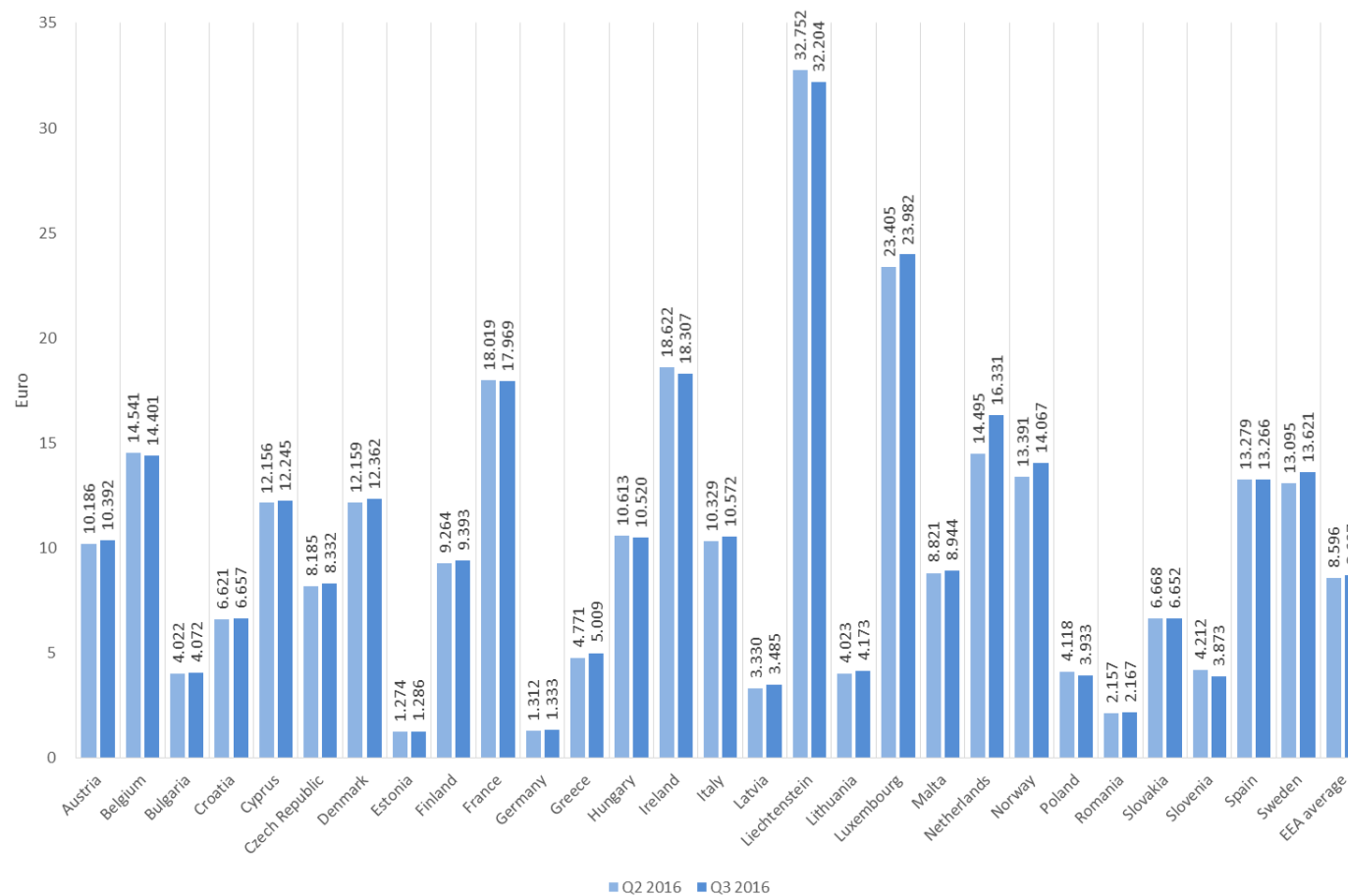
2016, data service volumes increased up to around 17.8 times their levels in Q3 2012 by Q3 2016⁷⁶.

The data shows that the consumption patterns and the used roaming tariff plans vary significantly between Member States. The minutes generated under RLAH+ tariffs account for the majority of voice traffic. Nevertheless some customers opted for the RLAH tariffs and in Q3 2015, 29.00 % of the minutes of calls made and 18.10 % of the minutes of calls received were generated by subscribers of RLAH tariffs. For text messages sent while roaming within EEA countries RLAH tariffs accounted for 33.75 % of the total volume in Q3 2016. There is a significantly different trend in the case of data roaming services. In Q3 2015 around 41.92 % of data traffic was based on the RLAH data tariff while roaming. However, these results must be analysed with considerable caution due to the difficulties to split roaming traffic related to the tariff plans introduced under the new roaming regime.

The average EEA roaming subscriber spent only 8.8 minutes per month calling other mobile users in Q3 2016. The number of received call minutes for subscribers abroad amounted to 9.5 minutes per EEA average roaming subscriber per month in Q3 2016. Data roaming ranged from 11 to 342 MB per roaming subscriber per month in Q3 2016 across EEA countries. It should be noted that these figures include business traffic.

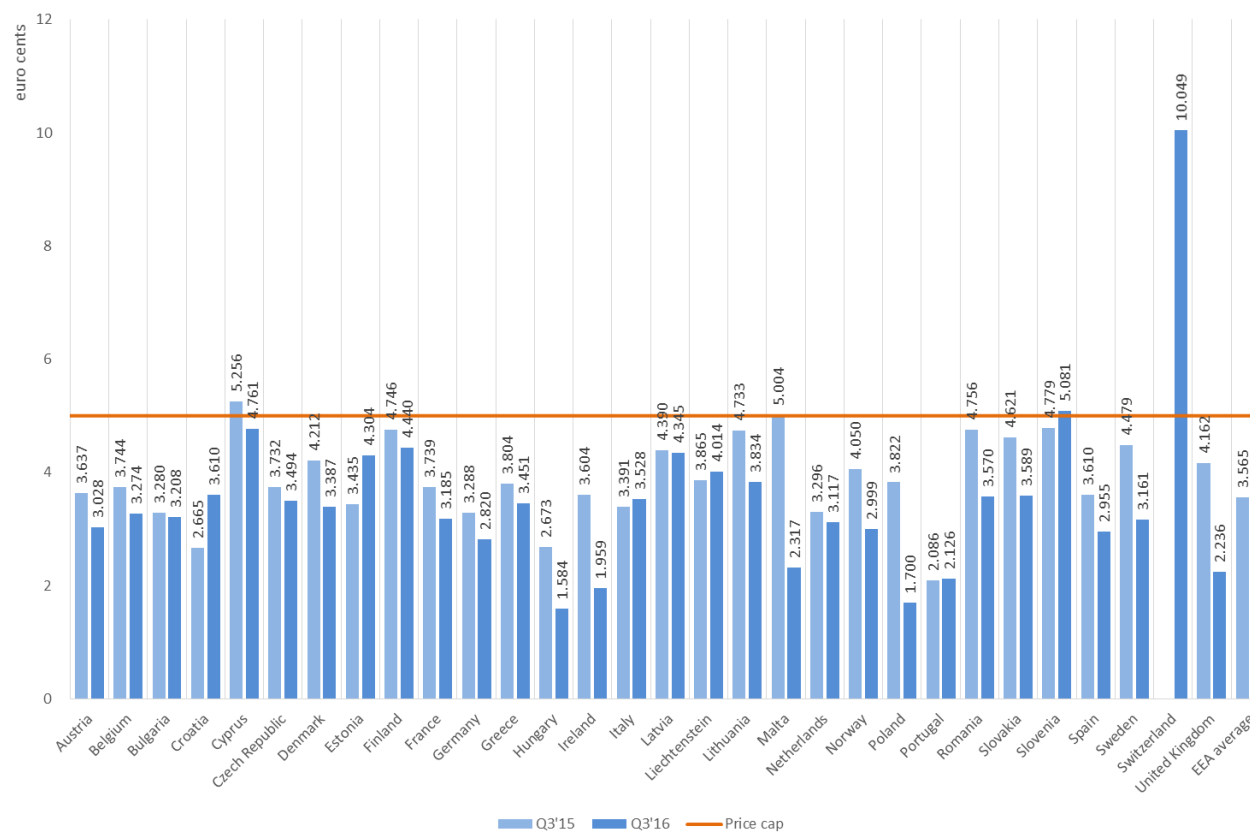
The figures below are extracted from the International Roaming BEREC Benchmark Data Report April – September 2016:

⁷⁶ It should be noted that the results displayed in the charts might take into account values from a different number of operators submitting data in the relevant quarters.

Figure 20: Domestic service: monthly retail revenue per subscriber (ARRPU) (prepaid+postpaid)⁷⁷

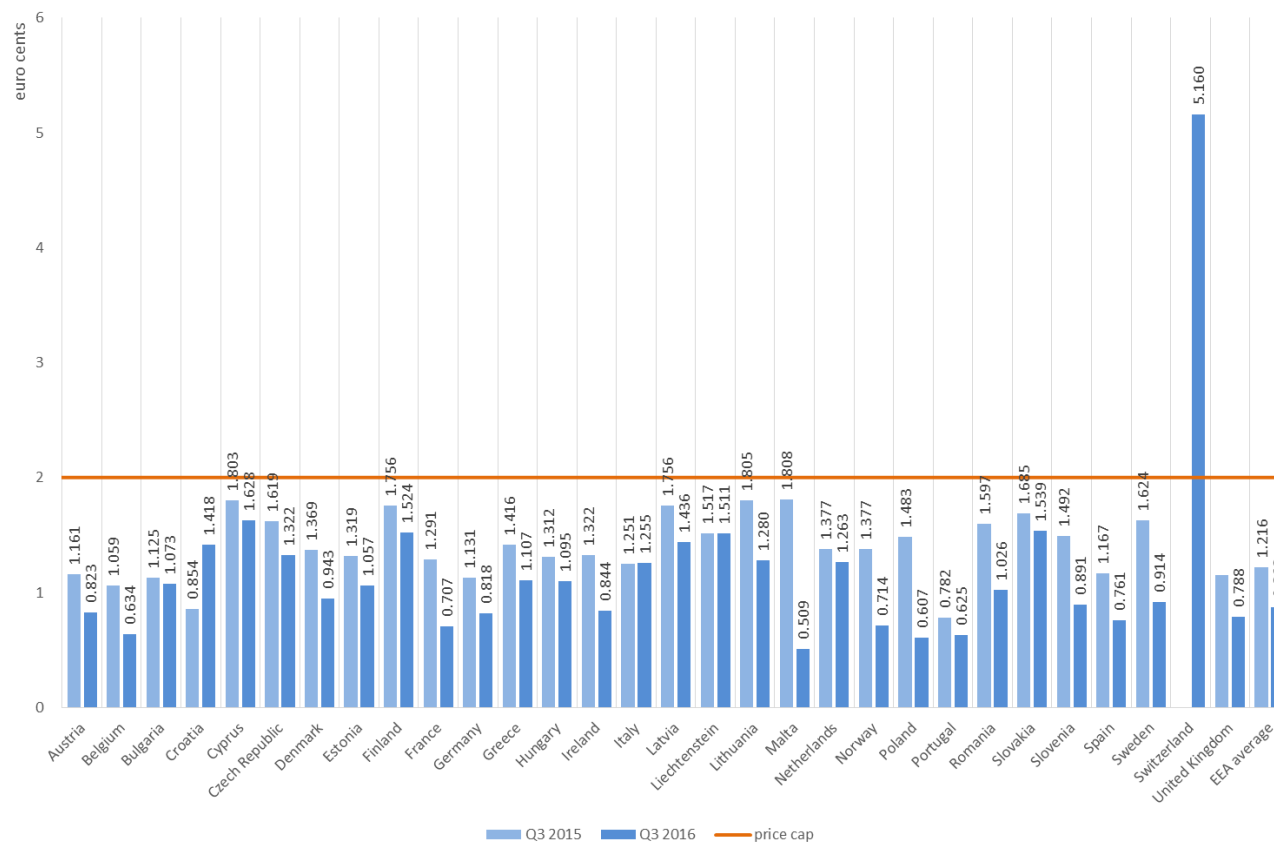
Source: BoR (17) 102 International Roaming BEREC Benchmark Data Report April – September 2016

⁷⁷ EEA average excludes Iceland, Portugal, UK

Figure 21: Total traffic (wholesale roaming inbound) Average wholesale price per minute for intra EEA roaming voice calls Q3 2016⁷⁸

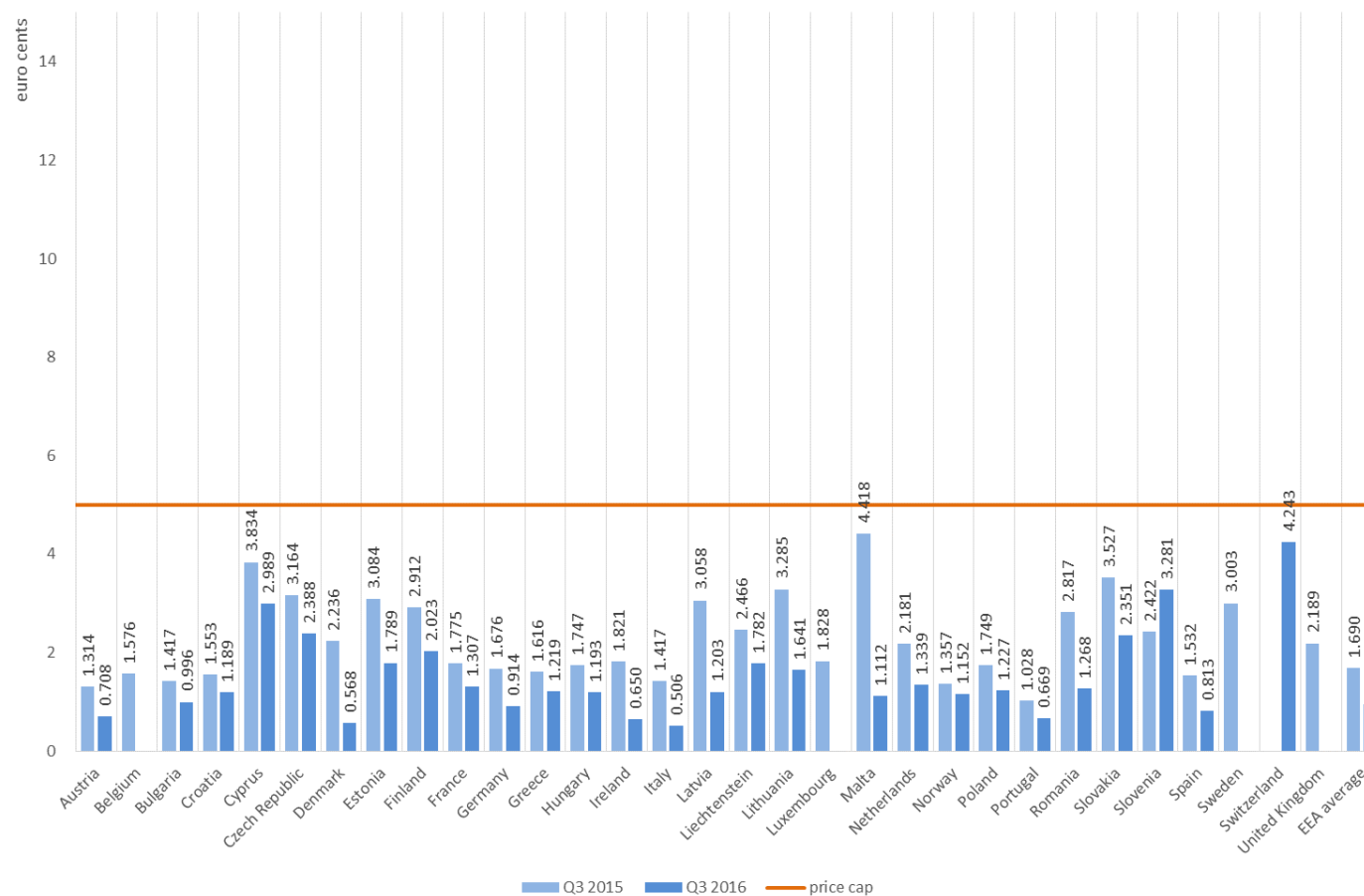
Source: BoR (17) 102 International Roaming BEREC Benchmark Data Report April – September 2016

⁷⁸Cyprus: statistics on revenues have been stated by the providers as received and not as billed therefore revenue received corresponding to other periods with higher rates might be included in the data reported
EEA average (Q3 2016) excludes Cyprus, Iceland

Figure 22: Average wholesale price per intra-EEA roaming SMS (Total traffic) in Q3 2016⁷⁹

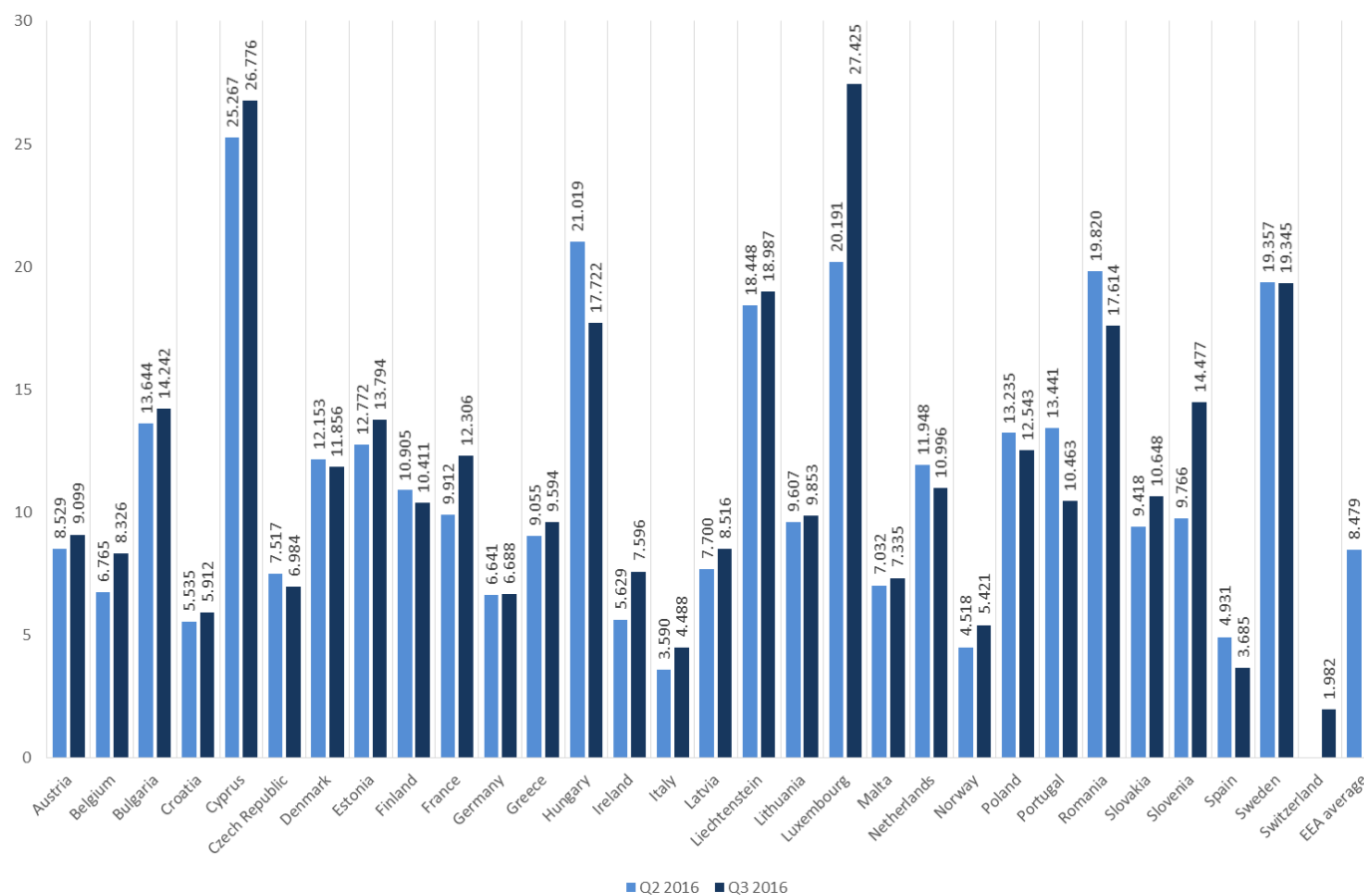
Source: BoR (17) 102 International Roaming BEREC Benchmark Data Report April – September 2016

⁷⁹EEA average excludes: Iceland, Luxembourg

Figure 23: Average wholesale data price in Q3 2016 (prepaid+postpaid) Total traffic⁸⁰

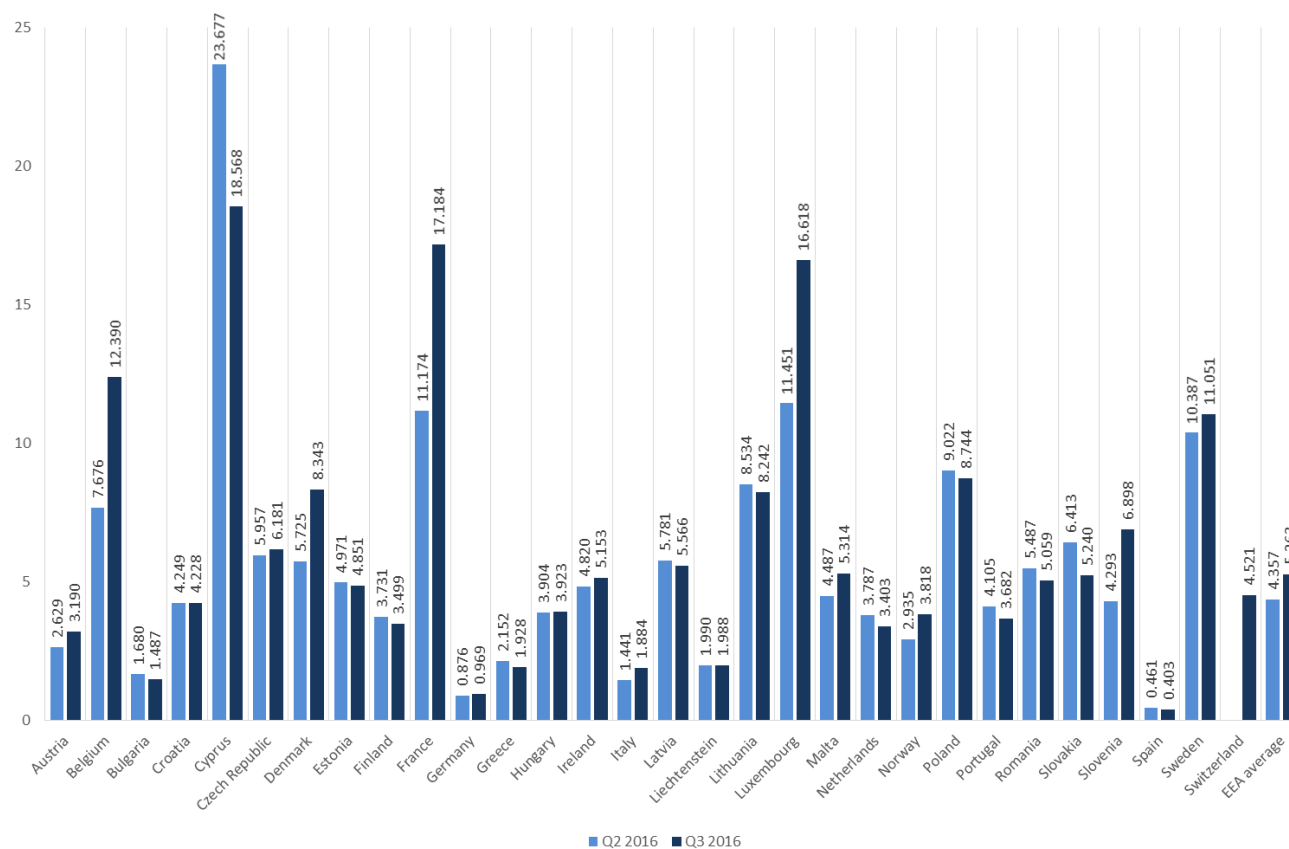
Source: BoR (17) 102 International Roaming BEREC Benchmark Data Report April – September 2016

⁸⁰ EEA average (Q2 2016) excludes Belgium, Iceland, Luxembourg, Sweden, UK

Figure 24: Average number of minutes per month per roaming subscriber in Q2 and Q3 2016⁸¹

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

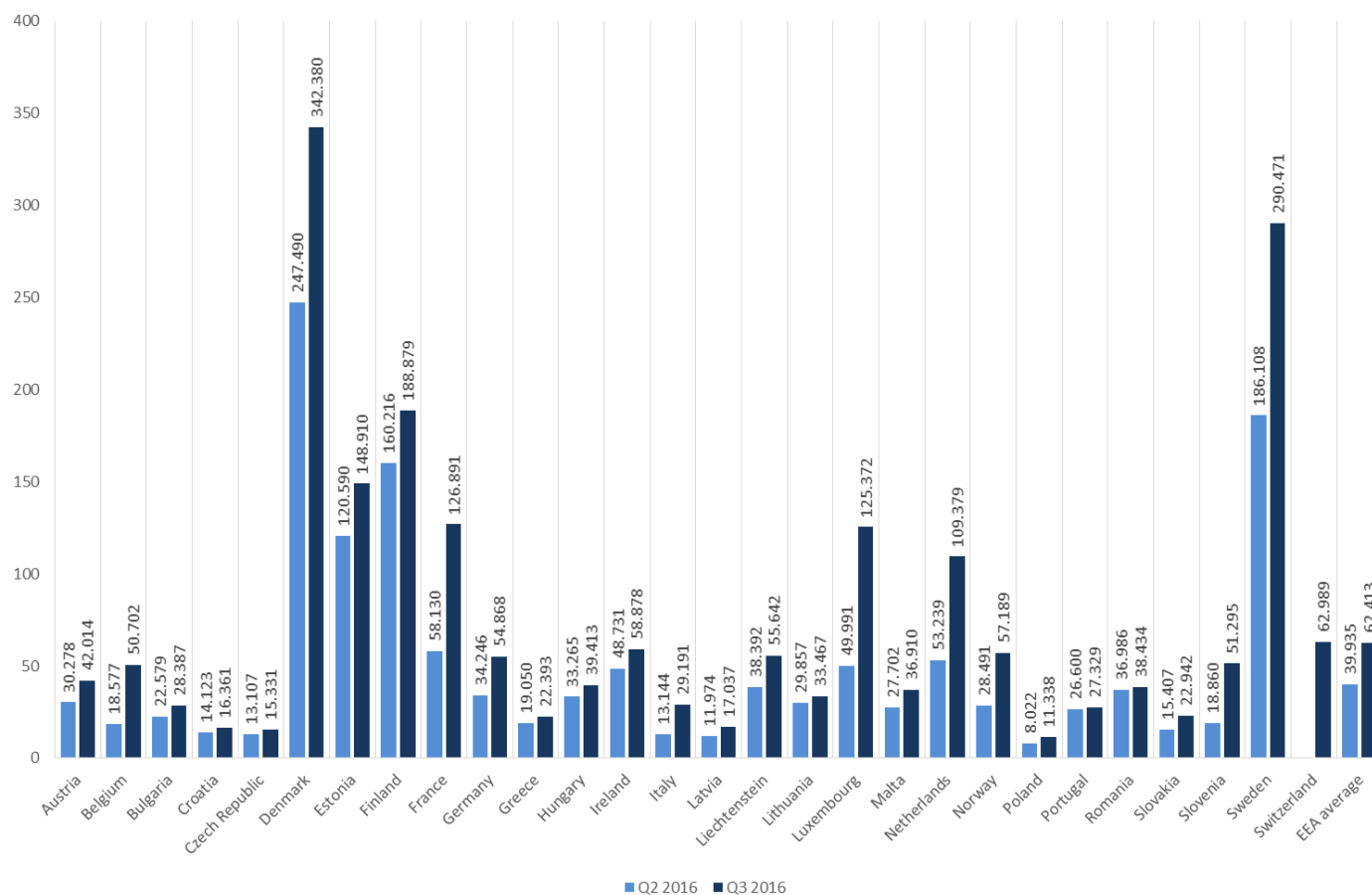
⁸¹ Norway: the Q2'16 value is based on data from June 2016
EEA average excludes Iceland, UK

Figure 25: Average number of SMS per month per roaming subscriber in Q2 and Q3 2016⁸²

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

⁸² EEA average excludes Iceland, UK

Norway: the Q2'16 value is based on data from June 2016

Figure 26: Data services: Average consumption per month per roaming subscriber (in MB) Q2 and Q3 2016⁸³

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

⁸³ Norway: the Q2'16 value is based on data from June 2016

EEA average excludes Cyprus, Iceland, Spain, UK

9. Development of termination rates

BEREC constantly monitors domestic⁸⁴ TRs in Europe and provides an overview report twice a year on FTRs, MTRs and SMS TRs.

Following NRA interventions 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 implementation of the Commission Recommendation on TRs, the wholesale rates both for mobile and fixed interconnection have fallen significantly and keep decreasing.

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

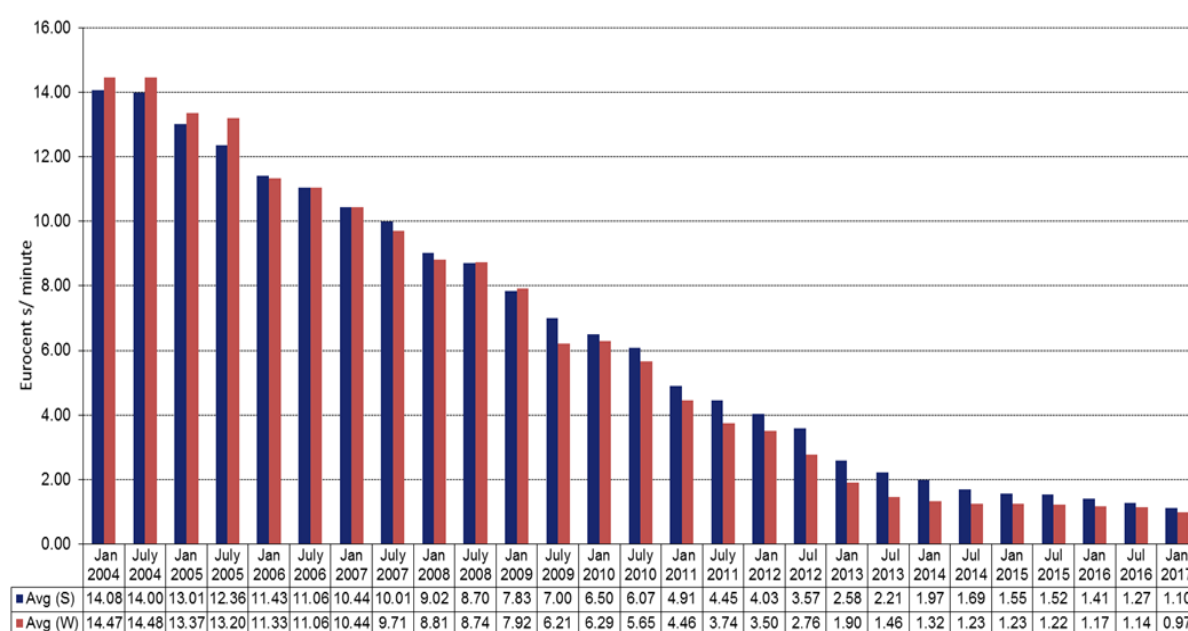
9.1 Mobile termination rates

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 (2009/396/EC), which established pure LRIC as the cost standard to be applied to the interconnection service for voice in mobile networks at the wholesale level. As shown in the graph below, wholesale interconnection rates for mobile telephony services in Europe fell markedly between January 2004 and January 2017: the simple average Avg (S) fell from 14.08 to 1.10 cents per minute, while the weighted average Avg (W) fell from 14.47 to 0.97 cents per minute⁸⁵.

⁸⁴ Referring to calls originating and terminating in the same EU country.

⁸⁵ In the BEREC periodic MTRs benchmarks, both a simple average and a weighted average are reported. The latter is calculated by weighting each country's average with the relative share of the country's subscribers (over all the subscribers). Number of countries included in the averages may vary each year.

Figure 27: Average MTR: Time series of simple average and weighted average at European level



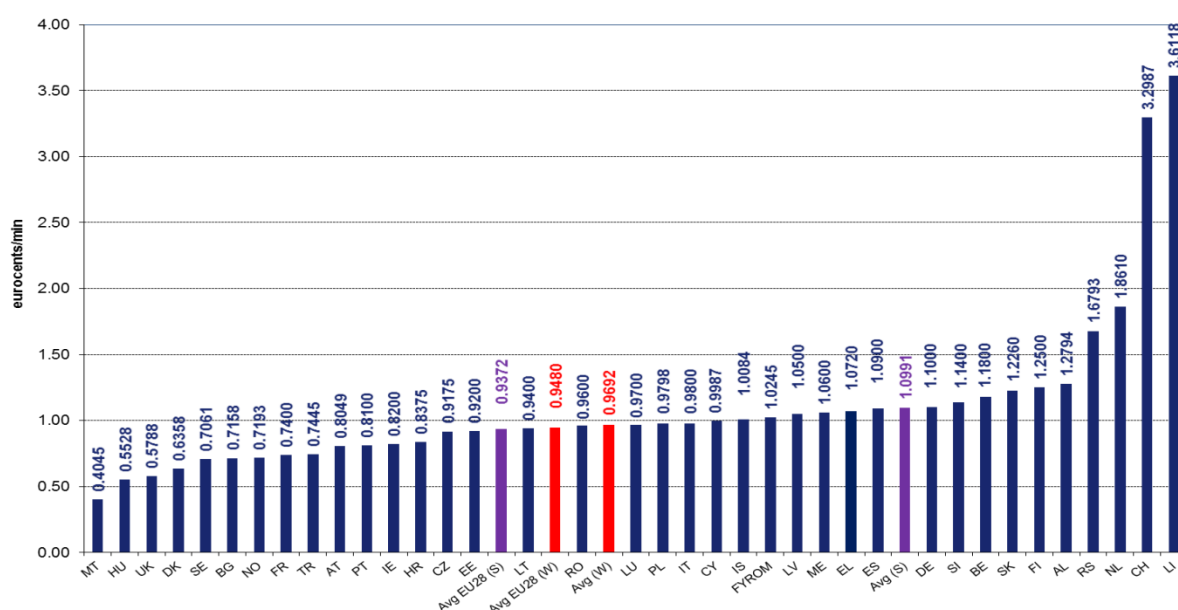
Source: Termination rates at European level January 2017

The MTR average (S) at the EU level (EU Member States only) stands at 0.9372 cents per minute, whereas average (w) at EU level is estimated at 0.9480 cents per minute.

For January 2017, individual Member States' and observers' average rates⁸⁶, together with European and EU simple and weighted averages, are shown in the graph below.

⁸⁶ Average MTR per country is obtained by weighting the average MTR of each operator by its market share, measured in terms of subscribers. Number of countries included in the averages may vary each year.

Figure 28: MTR per country - January 2017



Source: Termination rates at European level January 2017

9.2 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 harmonized by the Recommendation of 7.5.2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU (2009/396/EC), some differences can be found across the national regulatory regimes:

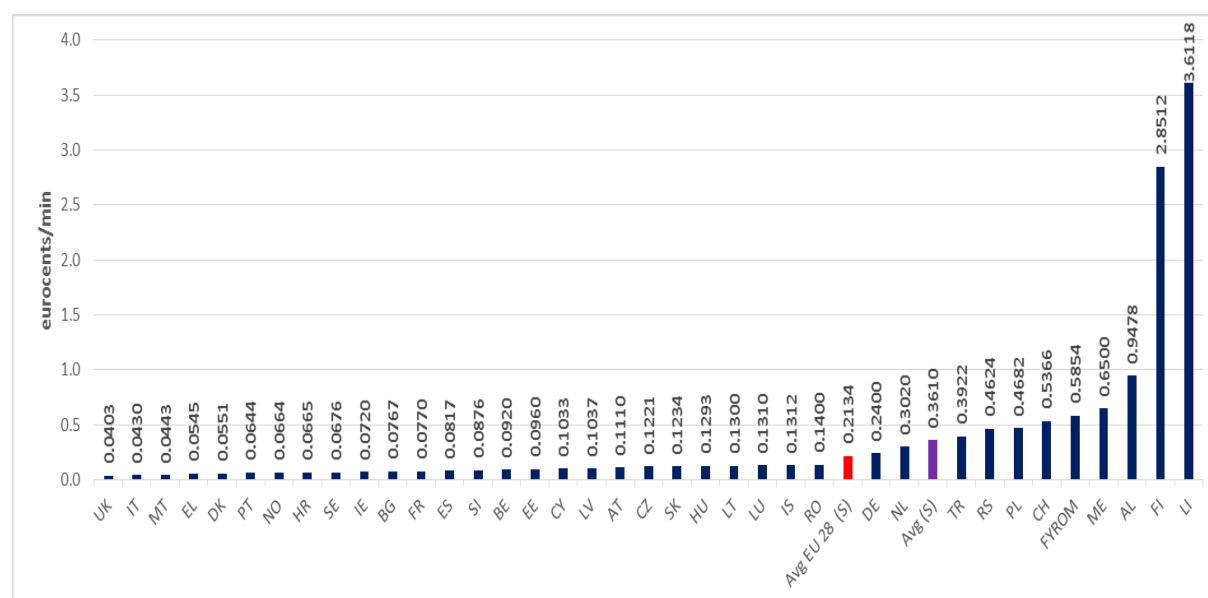
In some cases, the termination rate is a two-part tariff, i.e. composed of a variable part (to be paid for each minute of a call) plus a set-up or fixed part (to be paid for each call). In other cases, termination prices consist only of the variable part.

Overview of incumbents' lowest regulated⁸⁷ fixed termination rates per country are shown in the table below. Data refer to 1 January 2017 and include simple averages at the European level as well a simple average of EU 28 incumbents. The lowest regulated FTR simple average

⁸⁷ 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 increasing symmetry and decreasing relevance of layers the termination rates report features a ranking of the lowest regulated rates as well as a weighted average of peak and off-peak rates.

of incumbents at the European level (all 37 countries) stands at 0.36 cents per minute. The lowest FTR simple average of European Union incumbents stands at 0.21 cents per minute.

Figure 29: Overview of incumbents' lowest^{88,89, 90} regulated fixed termination rates per country – January 2017 (cents per minute of service)



Source: Termination rates at European level January 2017

9.3 Short message service termination rates

A traditionally important service in terms of revenues generated is the messaging (SMS/MMS) service. Just like voice calls, each SMS that originates 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 termination rates decreased from January 2016 to January 2017, from 2.57 to 2.38 cents per minute in terms of the simple average, and from 2.25 to 2.01 cents per minute in terms of the weighted average.

Individual Member States' average rates (cents per message) together with simple and weighted averages as of 1 January 2017 are shown in the graph below⁹¹.

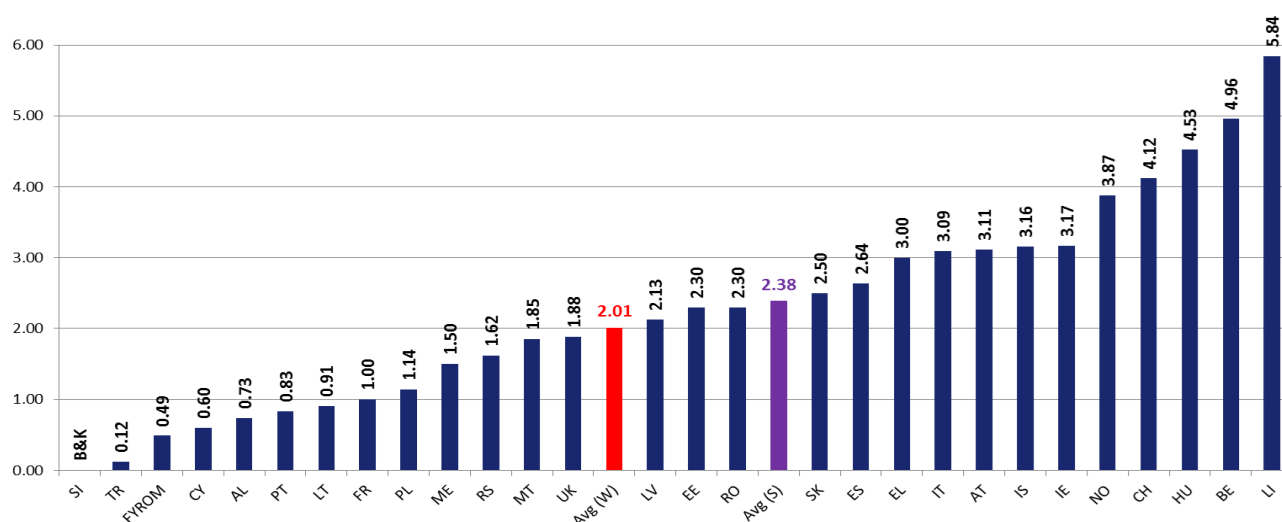
⁸⁸ The lowest regulated rate of the incumbent. In case the operator uses only one rate, it is considered as a single rate.

⁸⁹ Due to the large number of incumbents present in Finland a weighted average is included for comparison.

⁹⁰ The most recent German FTR rate benchmarked at 0.1 eurocent is currently in a phase II procedure.

⁹¹ B&K means that 'Bill & Keep' agreements are in place for traffic between all domestic operators: termination rates are reciprocally set to zero.

Figure 30: SMS TR per country – January 2017



Source: Termination rates at European level January 2017

10. Regulatory accounting developments in 2016

The overall picture of the cost accounting methodologies is relatively stable in comparison to last year with just a small number of changes by NRAs since last year. There are clear preferences for price control methods (cost orientation alone or in combination with price cap, but the overall picture is becoming more differentiated), cost base (current cost accounting – CCA) and allocation methodologies (mainly long run incremental costs (LR(A)IC) with fully distributed costs (FDC) preferred only in a few markets). The degree of consistent application of methodologies continues to be high and accommodates the use of elements or parameters that reflect national circumstances.

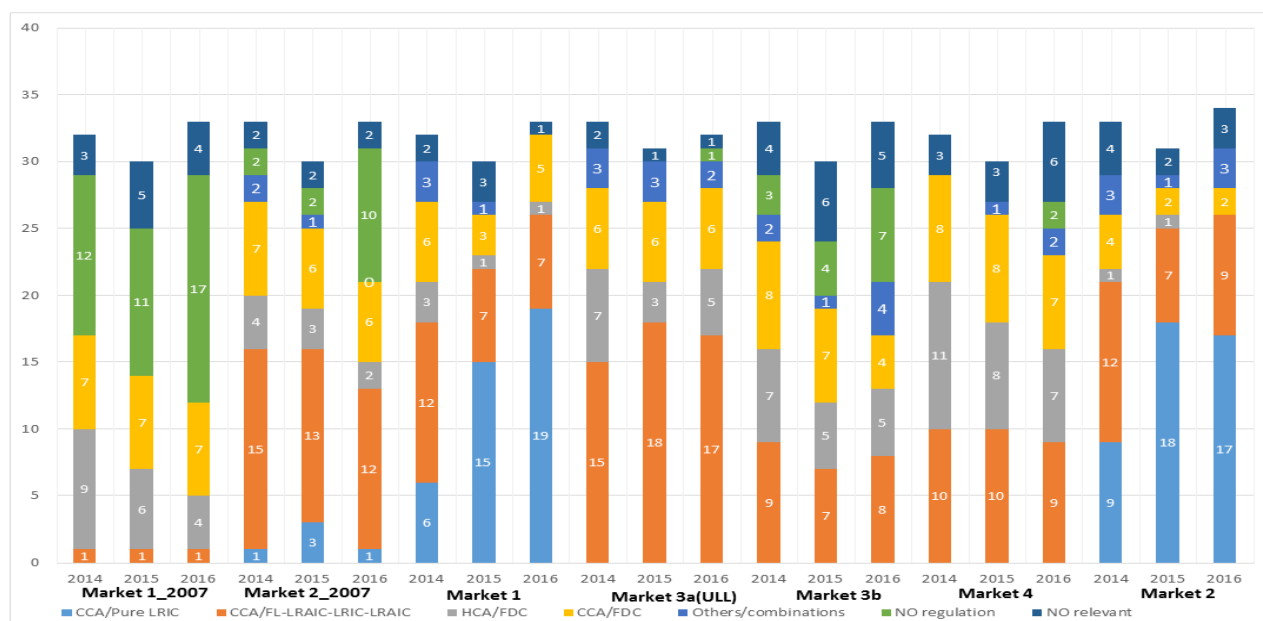
These findings reflect the primary cost base or allocation methodology selected by a NRA but do not bring out situations where a NRA would strengthen its financial analysis by comparing outcomes from one principal methodology with alternative approaches such as comparing bottom-up models with top-down or incurred costs. For all markets except market 1/2007 – and to a lesser extent in markets 3b and 4 – the combination of CCA and (FL) LR(A)IC is the most favoured approach; in particular, this combination is preferred in the termination markets (market 1 and market 2), where the LRIC approach often takes the form of pure LRIC to comply with the Recommendation 2009/396/EC on termination rates.

The analysis over time of the key wholesale markets – Local Access (market 3a), Central Access for mass-market products (market 3b) and High quality Access (market 4) – has shown a clear preference for cost orientation (and a complementary use of ERT (economic replicability test) in market 3a in 2016), a trend towards CCA and LRIC (reaching an even distribution of LRIC and FDC in market 3b in 2015) accounting methods and a preference for FDC in market 4. Slightly different results are observed for Wholesale Line Rental, where retail minus is the favoured price control method, HCA (historical cost accounting) and CCA are used quite in the same proportion and FDC is clearly the preferred choice of allocation methodology.

The following figure⁹² shows the combinations of cost base and accounting methodologies applied by NRAs.⁹³ There are four main combinations:

1. CCA and pure LRIC⁹⁴;
2. CCA and (FL)-LR(A)IC⁹⁵;
3. CCA/FDC;
4. HCA/FDC.

Figure 121: Combination Cost Base / Accounting Methods



Source: BEREC RA database 2014, 2015 and 2016

Note: the number of responses recorded varies over the years: 33 in 2016, 31 in 2015, 33 in 2014.

⁹² Figure 36 of the Regulatory Accounting in Practice Report 2016.

⁹³ This paragraph uses data collected by the BEREC RA EWG updated to April 2016. Possible inconsistencies with data in the previous paragraph arise from the different time periods used for collecting data and to ensure data consistency of time series.

⁹⁴ The combination CCA/pure LRIC has been added as a separate category since the 2014 report since several NRAs had adopted a pure BU-LRIC approach in line with Recommendation 2009/396/EC on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU.

⁹⁵ Referred to as CCA/LR(A)IC hereafter; the 'FL' will be omitted.

Taking into account the information detailed for different products in market 3a, it results that cost orientation is the preferred price control method for all products under analysis. As far as the allocation methodology is concerned, LR(A)IC is prevailing by far for all products except duct access products where also FDC is observed. For market 3a the breakdown by access products shows that NRAs mostly use 'tilted annuity' as the annualisation method (when CCA was declared as cost base). The breakdown in legacy and NGA products in market 3b did not show specific differences in terms of choice of costing methodologies.

The analysis of the structural data confirms that countries start from very different points in terms of population, topography, market situation, etc. These factors influence the regulation strategy of NRAs for the wholesale access markets.

The analysis of the main motivation behind the choice of the costing methodology showed that the 'strict cost orientation' is the instrument of choice to promote competition and stimulate investments and increase consumer benefit. Compared to previous years more NRAs declared their main motivation to be enhancing the replicability of infrastructures.

Regarding the WACC, the in-depth survey and the update provided in this report shows that nearly all NRAs use the Capital Asset Pricing Model (CAPM)⁹⁶ and hence the same parameters for determining the WACC, but the value of these parameters naturally differs reflecting different national financial market conditions. This is due to the underlying calculations that are based on economic and financial market circumstances as well as tax and inflation rates in the individual European countries. Furthermore, the regulatory periods and therefore the update periods for the WACC parameters differ in each country. No significant variations between fixed and mobile markets with regard to methodological choices can be seen. The analysis of the parameters used by NRAs to calculate the WACC shows a quite homogenous methodological approach for this calculation.

Overall the 2016 data confirms the trend towards an increasingly consistent approach to regulatory accounting approaches and a stabilisation in the application of particular methods for cost valuation or cost allocation among NRAs. The latter indicates that NRAs are providing predictable and stable regulatory environments in their countries. The convergence of regulatory accounting approaches is more pronounced for the termination markets whereas we see a more differentiated picture for the wholesale access markets reflecting the different national market situations and structural factors influencing the regulatory strategy.

Good progress has been made in developing effective regulatory accounting frameworks to meet the needs of NRAs. However, this is a complex and highly technical topic which requires regular maintenance and enhanced implementation of the regulatory accounting framework as competition develops, technology improves and new regulatory challenges emerge.

⁹⁶ Cf. BoR (13) 110.

CONCLUSION

The last year was rather busy for BEREC, which, under its medium-term strategy (2015-2017), its work programme for 2016 and its specific obligations under the TSM Regulation, notably with regard to the Net Neutrality Guidelines, approved several important pieces of work in response to market developments. Of particular note was the review of the regulatory framework for electronic communications. It is therefore appropriate to underline the approval and submission of BEREC's opinion on the framework review, which should assist the Commission in developing its legislative proposals.

BEREC also approved reports on subjects such as OTT, guidelines for the implementation of net neutrality provisions and layer 2 wholesale access products, either addressing areas that raise potential concerns or where synergies amongst NRAs are identifiable.

Relevant support to EU institutions was also given by BEREC within the context of the TSM Regulation that tackles roaming and net neutrality, issues that are highly positioned in the political agenda.

BEREC continues to address emerging topics, such as OTTs or Internet of Things, by launching public consultations on its relevant draft reports. These will ultimately also feed into the next framework review.

During 2016, guaranteeing consistency and continuity of its work, in line with its medium term strategy, BEREC developed some subjects launched in 2015, including the approval of its reports on OTTs and Internet of Things. A CP on layer 2 wholesale access products was also completed.

With regard to the TSM Regulation, BEREC has key deliverables on roaming and net neutrality, in particular the guidelines on the latter, which are keenly awaited by stakeholders.

In conclusion, BEREC is ready and looking forward to contributing to the framework review, notably by continuing to strengthen its engagement with, and support for, the EU institutions, as the legislative proposals are developed.

List of acronyms

ACM – Authority for Consumers and Markets (Netherlands)

ADSL – Asymmetric Digital Subscriber Line

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)

ANO – Alternative Network Operator

APDC – Associação Portuguesa para o Desenvolvimento das Comunicações

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

ARPU - Average Revenue per User

ARRPU - Average Retail Revenue per User

BEREC – Body of European Regulators for Electronic Communications

BEUC - Bureau Européen des Unions de Consommateurs

BIPT – Belgian Institute for Postal Services and Telecommunications

BMK – Benchmarking

BNetzA – Federal Network Agency (Germany)

BoR – Board of Regulators

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

CCA – Current Cost Accounting

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)

CP – Common Position

CPE – Customer Premises Equipment

CRC – Communications Regulation Commission (Bulgaria)

CRTC – Canadian Radio-Television and Telecommunications Commission

CTU – Czech Telecommunication Office

DBA – Danish Business Authority

DG – Directorate General

DG CONNECT – Directorate General for Communications, Networks, Content & Technology

DSM – Digital Single Market

EaPeReg – Eastern Partnership Electronic Communications Regulators Network

EBA – European Banking Authority

ECODEM – Ecosystem Dynamics and Demand-Side Forces in Net Neutrality

ECS – Electronic Communications Service(s)/Sector

ECTA – European Communities Trade Mark Association

EDF – European Disability Forum

EEA – European Economic Area

EENA – European Emergency Number Association

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

ERG – European Regulators Group

ERGA – European Regulators Group for Audiovisual Media Services

ERGP – European Regulators Group for Postal Services

ESA – European Supervisory Authorities

ESMA – European Securities and Markets Authority

ETNO – European Telecommunications Network Operators' Association

ETNS – European Telephony Numbering Space

ETRA – Estonian Technical Regulatory Authority

EU – European Union

EWG – Expert Working Group

FCC – Federal Communications Commission (United States of America)

FDC – Fully-Distributed Costs

FICORA – Finnish Communications Regulatory Authority

FL LRAIC – Forward-Looking Long-Run Average Incremental Costs

FNI – Fixed Network Incumbent

FT-ETNO Summit – Financial Times-European Telecommunications Network Operators' Association Summit

FTR – Fixed Termination Rate

FTTC/B – Fibre-To-The-Cabinet/Building

FTTH – Fibre-To-The-Home

FTTP – Fibre-To-The-Premises

FUP – Fair Use Policy (in relation to roaming)

GB – Gigabyte

GDP – Gross Domestic Product

GSM – Global System for Mobile Communications

GSMA – Global System for Mobile Communications Association

HAKOM - Croatian Regulatory Authority for Network Industries

HCA – Historical Cost Accounting

HDM – Harmonisation of Digital Markets

HICP – Harmonised Index of Consumer Prices

HK – Hong Kong

IAS – Internet Access Services

IC – Interconnection

ICANN – Internet Corporation for Assigned Names and Numbers

ICTA – Information and Communication Technologies Authority (Turkey)

ILR – Institut Luxembourgeois de Régulation (Luxembourg)

IoT – Internet of Things

IP – Internet Protocol

IPvIC – Internet Protocol Voice Interconnection

IR – International Roaming

IS-Portal – Information Sharing- Portal

ISCs – Individual Service Categories

ITRE – European Parliamentary Committee on Industry, Research and Energy

ITU – International Telecommunication Union

KCC – Korea Communications Commission

LATAM-EU TMR Symposium – Latin America-EU Symposium on Telecoms & Media Regulation

LLU – Local Loop Unbundling

LR(A)IC – Long Run (Average) Incremental Costs

LSA – Licensed Shared Access

LTE – Long-Term Evolution

MB – Megabyte

MCA – Malta Communications Authority

MMF – Mobile Manufacturers Forum

MMS – Multimedia Messaging Service

MNO – Mobile Network Operator

MTR – Mobile Termination Rate

MVNO – Mobile Virtual Network Operator

NCA – National Competition Authority

NFV – Network Functions Virtualisation

NGA – Next Generation Access

Nkom – Norwegian Communications Authority

NNHH – National Media and Infocommunications Authority

NRA – National Regulatory Authority

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

OFCA – Office of the Communications Authority (Hong Kong)

OFCOM – Office of Communications (United Kingdom)

OFNO – Other Fixed Network Operator

OTT – Over-the-Top

PoH – Point of Handover

Pol – Point of Interconnection

PRD – Project Requirements Document

PTA – Post and Telecom Administration (Iceland)

PTS – National Post & Telecommunications Agency (Sweden)

QoS – Quality of Service

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

Regulatel – Latin American Forum of Telecommunications Regulators

RIPE NCC – Regional Internet Registry for Europe, the Middle East and parts of Central Asia

RLAH – Roam Like At Home

RoW – Rest of the World

RRT – Communications Regulatory Authority (Lithuania)

RSPG – Radio Spectrum Policy Group

RTR – Austrian Regulatory Authority for Broadcasting and Telecommunications

RU – Regulatory Authority for Electronic Communications and Postal Services (Slovak Republic)

SA – Surveillance Authority

SDN – Software Defined Networking

SLU – Sub-Loop Unbundling

SMP – Significant Market Power

SMS – Short Message Service

SPRK – Public Utilities Commission (Republic of Latvia)

TDM – Time-Division Multiplexing

TR – Termination Rate

TSM – Telecom Single Market

UK – United Kingdom

UKE – Office of Electronic Communications (Poland)

US – Universal Service

USD – Universal Service Directive

US FCC – United States Federal Communications Commission

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

VLAN – Virtual Local Area Network

VULA – Virtual Unbundled Local Access

WACC – Weighted Average Cost of Capital

WAP – Wholesale Access Product

WCA – Wholesale Central Access

WHQAFL – Wholesale High Quality Access at a Fixed Location

WLA – Wholesale Local Access

WLR – Wholesale Line Rental

WP – Work Programme