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Digital Economy and Society Index (DESI) 2018

Digital Economy and Society Index Report 2018

Contents

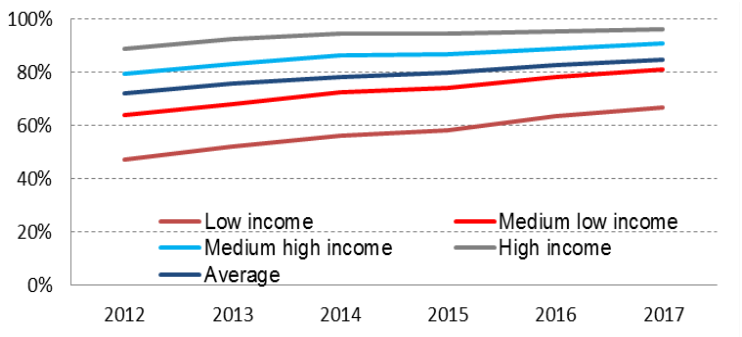
1. Connectivity: Broadband market developments in the EU (cont'd)

Broadband take-up tends to be lower in Member States where the cost of broadband access accounts for a higher share of income, but this correlation is not strong. Based on the Broadband Price Index, fixed broadband is most affordable in Finland, France and Lithuania.

Income plays an important role in broadband take-up. The lowest income quartile has a take-up rate for fixed broadband of just 67 %as opposed to 96 % in the highest income quartile.

The Broadband Price Index is a score[1] that measures the prices of twelve representative broadband baskets as a percentage of household income. The baskets include three speed categories (12-30 Mbps, 30-100 Mbps and at least 100 Mbps) and four types of products (standalone internet, internet + TV, internet + fixed telephony and internet + TV + fixed telephony).

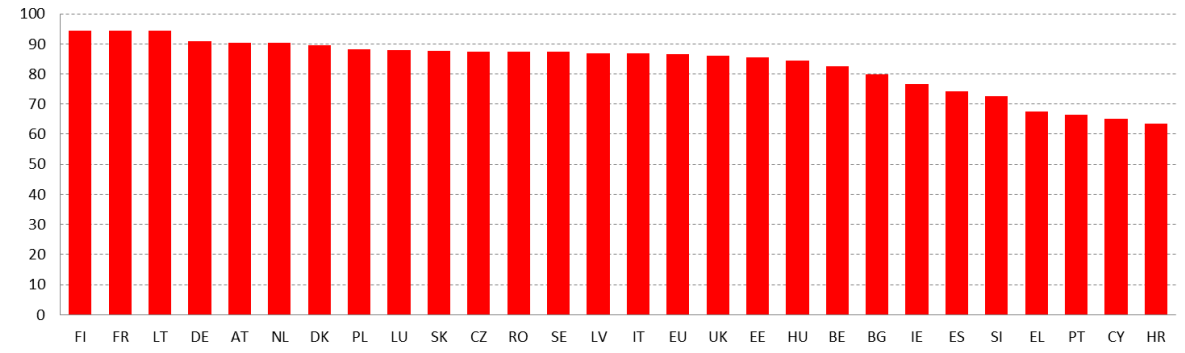
Figure 1.56 Broadband household penetration by income quartiles at EU level (% of households), 2012 – 2017



Source: Eurostat

[1] 0 to 100, 100 being the best

Figure 1.57 Broadband Price Index, 2017



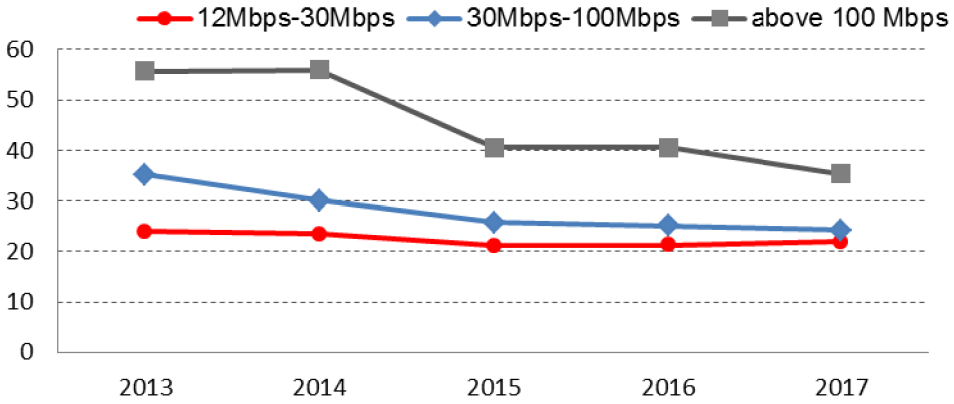
Source: Commission services based on Empirica and Eurostat

Prices[2] of fast broadband access tend to decrease over time but vary widely between Member States.

Broadband access prices (minimum prices, calculated on Purchasing Power Parity) vary between EUR 8 and EUR 43 for a standalone offers with a minimum download speed of 12 Mbps. The minimum prices were the lowest in Denmark (EUR 7.7), Lithuania (EUR 13) and Romania (EUR 13), while the highest were in Portugal (EUR 43), Ireland (EUR 36.2), Luxembourg (EUR 35), Spain (EUR 33), Slovenia (EUR 33) and Cyprus (EUR 32).

As for offers of at least 100 Mbps, the European average stands at EUR 35 with a substantial decrease from 2016.

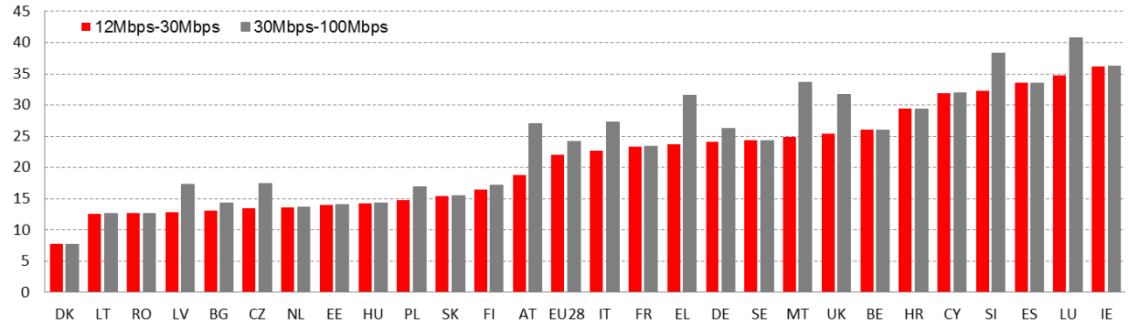
Figure 1.58 Broadband retail prices (EUR PPP) – Standalone offers, 2013 - 2017



Source: Empirica and Van Dijk, 2013 to 2017

[2] Based on the least expensive monthly prices available and expressed in euros, adjusted for purchasing power parity, VAT included.

Figure 1.59 Fixed broadband retail prices (EUR PPP) - Standalone offers, October 2017



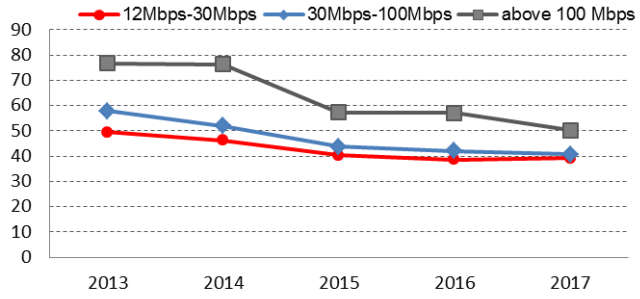
Source: Empirica, Fixed Broadband Prices in Europe (2017)

Prices[3] of triple play bundles[4] including fast broadband access, fixed telephony and television have gone down by 27 % since 2013.

The minimum prices for triple play bundles including broadband access (with a download speed between 30 and 100 Mbps), fixed telephony and television vary between EUR 13 and EUR 61 in the EU. The lowest prices were recorded in Lithuania (EUR 13), France (EUR 23) and Bulgaria (EUR 28), while the highest were in Belgium (EUR 61), Spain (EUR 56), Ireland (EUR 55), Portugal (EUR 54), Malta (EUR 53) and Denmark (EUR 52).

The EU average prices of at 100 Mbps offers stands at EUR 50 with a decrease of EUR 7 from 2016.

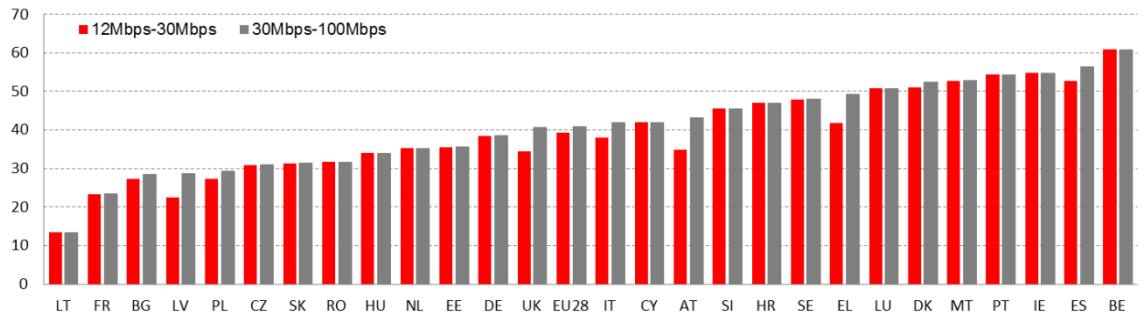
Figure 1.60 Broadband retail prices (EUR PPP) – Bundles including broadband, fixed telephony and television, 2013-2017



Source: Empirica and Van Dijk, 2013 to 2017

[3] Based on the least expensive prices available and expressed in euros, adjusted for purchasing power parity, VAT included.
[4] No data available for Finland.

Figure 1.61 Broadband retail prices (EUR PPP) – Bundles including broadband, fixed telephony and television, October 2017



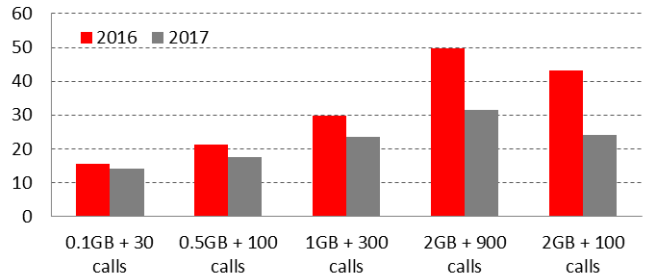
Source: Empirica, Fixed Broadband Prices in Europe (2017)

Prices of mobile voice and data plans vary greatly across Europe. Prices went down in all consumption baskets, including 2 GB of mobile broadband and 900 voice calls or 100 voice calls went down by 37 % and 44 % respectively from 2016.

Looking at the usage basket of 300 voice calls and 1GB data, minimum prices range between EUR 9 and EUR 62 with an EU average of EUR 24.

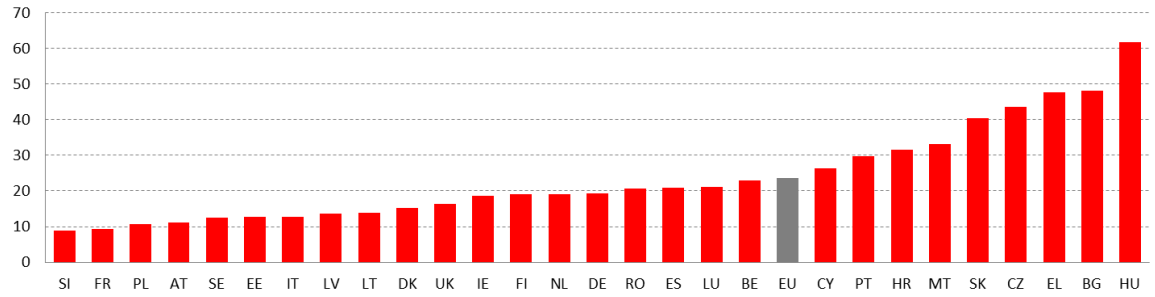
The cheapest countries are Slovenia, France, Poland, Austria, Sweden, Estonia and Italy with minimum prices below EUR 13. By contrast, prices are high in Hungary (EUR 62), Bulgaria (EUR 48) and Greece (EUR 48).

Figure 1.62 Mobile broadband prices (EUR PPP) - handset use in the EU, 2016 – 2017



Source: Van Dijk and Empirica, 2016 and 2017

Figure 1.63 Mobile broadband prices (EUR PPP) - handset use, 1GB + 300 calls + 225 SMS, 2017



Source: Empiricia, Mobile Broadband Prices study, February 2017

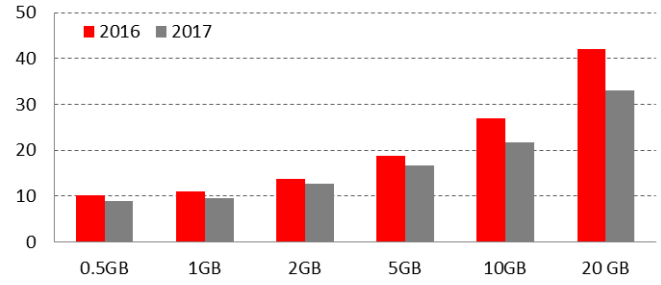
Prices of mobile broadband plans for laptops and tablets also show large differences across Europe. On average, prices have decreased for all types of consumption baskets since 2016, ranging between 8 % and 21 %.

Looking at 5GB data-only plans for laptops, minimum prices range between EUR 3.7 and EUR 42. The EU average (EUR 17) is below the price of fixed standalone offers of 12-30 Mbps.

The cheapest countries are Italy, Poland, Sweden, Latvia and Austria, with prices below EUR 10. At the same time, prices are very high in Cyprus (EUR 43).

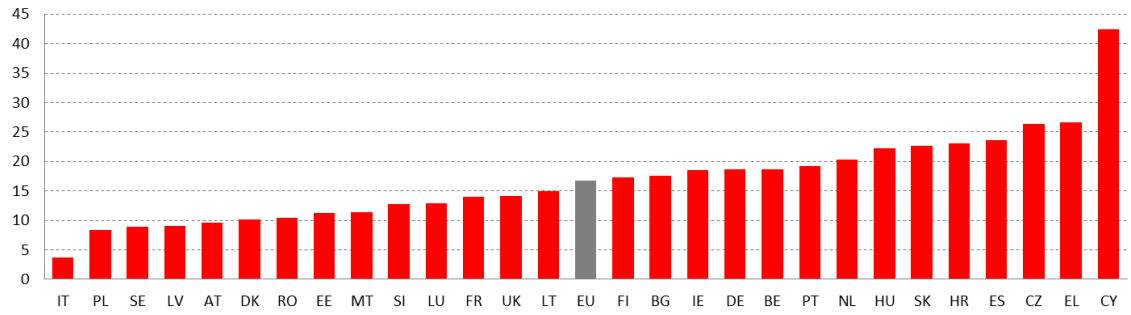
Laptop prices have decreased for all types of consumption baskets since 2016. The largest price drop is registered in the highest consumption basket (20 GB), with a 21 % decrease.

Figure 1.64 Mobile broadband prices (EUR PPP) – laptop use in the EU, 2016 – 2017



Source: Van Dijk and Empirica, 2016 and 2017

Figure 1.65 Mobile broadband prices (EUR PPP) – laptop/tablet use, 5 GB, 2017



Source: Empiricia, Mobile Broadband Prices study, February 2017

Mobile prices in the world: in comparison with the US, the EU is cheaper for handset usage baskets, and more expensive for high-end data-only (laptop/tablets) packages.

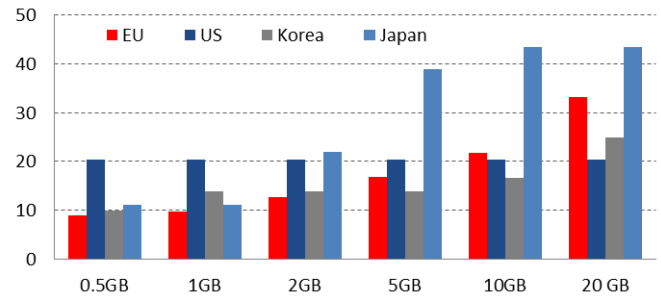
In South Korea and the US, no offers adapted to the lower-usage baskets were found on the market, which is why those two countries might seem overpriced. The least expensive data-only offer in the United States allows up to 23 GB of data, but the maximum download speed is only 2 Mbps.

In the case of Japan, prices seem much higher for baskets with 5 GB, 10 GB and 20 GB than the other economies. On average, the EU performs well for lower baskets, but prices are higher than South Korea and the US for high-end baskets (especially 20 GB).

Regarding handset use baskets, for those below 2 GB data usage, the US offers flat rates for calls and messages for EUR 26.7 in 2017. Additionally, offers in South Korea include 5 GB for all data consumption.

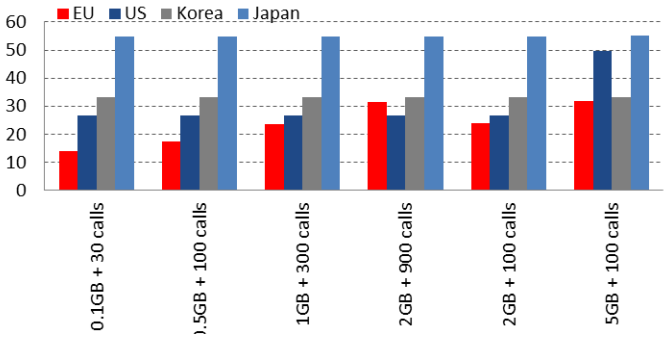
On average, the EU performs well in all data consumption basket, with much lower prices than South Korea and Japan. When comparing EU and US prices, prices are lower for all baskets, with the exception of the basket with 2 GB data and high intensity of voice calls (900 calls) where average EU prices are above US.

Figure 1.66 Mobile broadband prices (EUR PPP) - laptop/tablet use in the EU, the US, Japan and South Korea, 2017



Source: Empirica, Mobile Broadband Prices study, 2017

Figure 1.67 Mobile broadband prices (EUR PPP) - handset use in the EU and the US, Japan and South Korea, 2017



Source: Empirica, Mobile Broadband Prices study, 2017

Telecoms markets: General trends

Under the **connectivity objectives for the European gigabit society**, by 2025 all European households need to have access to at least 100 Mbps connectivity (upgradable to Gbps). In addition, gigabit connectivity should be available for all main socioeconomic drivers and all urban areas, while major terrestrial transport paths should have uninterrupted 5G coverage.

In many Member States the **deployment of fibre networks (FTTH/B)** has increased. This is *inter alia* due to the supporting regulatory measures (e.g. access to ducts), as well as co-investment agreements, commercial wholesale access agreements and mobile network sharing agreements. Very often, however, FTTB/FTTH is almost exclusively deployed in urban areas and in business parks. As regards take-up of very high speed networks (over 100 Mbps), there has often been a difficult early period in most areas where unfamiliar new access services are deployed, before demand picks up.

Most Member States have **national broadband plans** in place that focus (among other things) on reaching minimum download speeds. Some Member States have adjusted their plans to reflect the gigabit objectives.

Many Member States have either: (i) publicly consulted on **5G-**related challenges (e.g. conditions for 5G roll-out, new use cases, technologies and services, new bands) when setting up a national strategy; (ii) have already published a national plan or strategy; or (iii) at least entered such plan or strategy in their government programmes. A few Member States have earmarked investments to promote the development of 5G. Many operators have started or announced 5G trials.

Effective and impartial governance of telecoms markets is crucial in fast-changing markets. Still, in some Member States concerns have arisen about the national regulatory authority's independence and regulatory capacity. Both should be ensured and must not be undermined.

The trend towards offering **bundled services and fixed-mobile convergence** continues and in many Member States has even increased significantly. Offers consisting of two or three services are the most frequent bundles. Often it is difficult for new customers to obtain services as a single offer. Moreover, access to (premium) content has become a clear competitive advantage in many markets.

More EU-harmonised spectrum underpins future spectrum needs within the EU, while assignment varies between national markets

Following the adoption of Commission Implementing Decision (EU) 2016/687 harmonising the 700 MHz band, the total amount of spectrum harmonised at EU level for wireless broadband use amounts to 1 090 MHz.

Member States are required to authorise the 700 MHz band by 2020, unless there are justified reasons[5] for delaying it until mid-2022 at the latest. The authorisation process has already been completed in three Member States (Finland, France and Germany).

All Member States but one have met the first milestone set out in the Decision, which is to finalise cross-border coordination with other Member States by 31 December 2017. This is a major success for roadmap-based migration across Europe, which is embedded in EU legislation with a binding end date for assignment.

The 800 MHz band (the 'digital dividend') is currently assigned (in two cases not entirely) in 26 Member States, 11 of which had been granted a derogation from the original deadline under

[5] A limited list of justified reasons is set out in the Annex to the Decision of the European Parliament and the Council on the use of the 470-790 MHz band in the Union.

Article 6(4) of the Radio Spectrum Policy Programme (RSPP). Two Member States have not yet assigned and/or made available the 800 MHz band: while Malta resumed the assignment process[6] after the withdrawal of a proposed merger between two of the three mobile operators, Bulgaria still invokes the exception under Article 1(3) RSPP due to incumbent military use.

Moreover, with a view to reaching the target of 1 200 MHz harmonised for wireless broadband set by the RSPP, the Commission is working on the possible extension of the 1.5 GHz band to provide additional download capacity for 5G services representing an additional 50 MHz[7].

A slight increase, in absolute terms, in the amount of EU-harmonised spectrum assigned on average across Member States for wireless broadband use can be reported since 2016. As far as the assignment of the 700 MHz band is concerned, most of the Member States are taking the necessary measures to meet the 2020 deadline.

Bands above 1 GHz have the potential for additional capacity. While these remained partly unassigned in many Member States, they will play an even larger role in the deployment of 5G services.

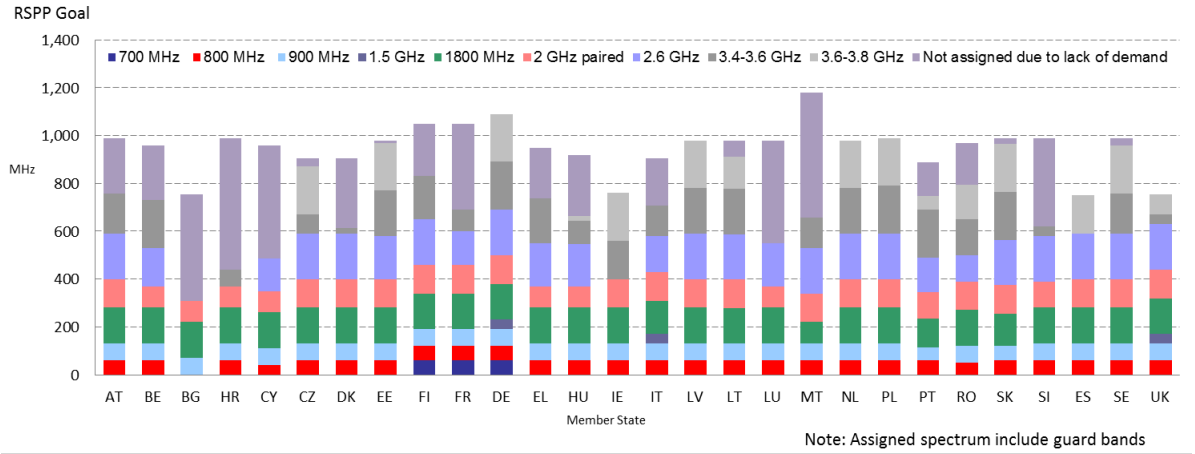
Lack of assignment may be due to different reasons depending on the circumstances in each Member State. These include: delays in making the spectrum available and in the carrying out of assignment procedures, lack of market interest and use for defence purposes.

However, several Member States are currently preparing to assign the 3.6 GHz band. This is particularly important, as the 3.6 GHz band was identified at EU level as one of what are called the 5G pioneer bands.

In this context, and in view of the possible derogations and exceptions applicable to different bands, lack of assignment does not necessarily mean non-compliance with EU law.

[6] The procedure concluded on 9 April 2018, with the assignment of the 800 MHz band and the 2.6 GHz band.
[7] The adoption of a harmonisation decision on the 1.5 GHz extension bands is ongoing at the time of writing. Once such Commission Implementing Decision will enter into force, the total amount of spectrum harmonised for wireless broadband will go up to 1140 MHz.

Figure 1.68 Assigned spectrum in harmoised EU bands, end of February 2018



Source: Commission services

The Commission has sent warnings to several Member States not carrying out the analysis of the relevant telecom markets on time.

National regulatory authorities must carry out an analysis of telecom markets susceptible to regulation every 3 years (Article 16(6)(a) of the Framework Directive).

As markets evolve and competition develops, regulatory remedies imposed in the past need to be adjusted or even removed to adapt to the developing market conditions.

In the European Electronic Communications Code, the Commission has proposed to extend the market review cycle to 5 years (instead of 3) to achieve a better balance between adequacy and appropriateness of regulation — on the one hand — and the legal certainty and stability of regulation — on the other.

In October 2017, the Commission sent letters of formal notice to seven Member States where the delays were even over 5 years: the countries concerned were Belgium, Spain, Ireland, Hungary, Slovenia, Poland and Romania[8].

The markets in question include not only key broadband markets as listed in the 2014 Recommendation on relevant markets for the purpose of *ex ante* regulation in the electonic communications sector but also 'older' markets removed from the list and which are still regulated in some Member States on the basis of very outdated market analyses.

Figure 1.69 State of play of relevant markets reviews notified under Article 7 cases as of 1 January 2018

[8] Spain and Slovenia have notified the corresponding market reviews in early 2018.

Effective competition - no ex ante regulation
No effective competition - ex ante regulation
Partial competition - partial ex ante regulation

1 1st round-competition/regulation
2 2nd round-competition/regulation
3 3rd round-competition/regulation
4 4th round-competition/regulation

	2014 RECOMMENDATION					2007 REC.		2003 RECOMMENDATION							
	Call term. on fixed network	Voice call term. on mobile networks	Wholesale local access	Wholesale central access	Wholesale high-quality access	Access to PSTN for res & non-res.	Call orig. on fixed network	Local/nat. Call for res.	Internat. call for res.	Local/nat call for non-res.	Internat. call for non-res.	Retail LL	Transit on fixed network	Trunk segments LL	Access & call orig. on mobile network	Broadcast Transmis.
	Market 1	Market 2	Market 3a	Market 3b	Market 4	ex-Mkt 1	ex-Mkt 2	ex-Mkt 3	ex-Mkt 4	ex-Mkt 5	ex-Mkt 6	ex-Mkt 7	ex-Mkt 10	ex-Mkt 14	ex-Mkt 15	ex-Mkt 18
Austria	3	4	5	5	4	4	4	3	2	4	3	4	1	2	1	3
Belgium	2	3	2	2	1	2	1	3	1	3	1	1	2	1	1	w
Bulgaria	5	3	2	2	3	2	3	2	2	2	2	1	1	1		
Croatia	1	1	1	1	1	1	1	1		1		1		1		
Cyprus	2	3	4	4	2	3	3	3	2	3	2	2	3	2	3	3
Czech Republic	4	4	4	4	3	4	4	2	2	2	1	2	1	1	1	2
Denmark	4	4	4	4	4	3	3	2	2	1	1	2	1	1	1	1
Estonia	3	4	4	4	3	3	3	1	1	1	1	1	1	2	1	3
Finland	2	1	3	3	1	2	3	2	1	2	1	2	2	1	V	3
France	5	5	5	5	3	5	5	1	1	1	1	2	1	2	W	4
Germany	5	5	3	3	2	3	3	2	1	2	1	2	2	1	1	3
Greece	3	4	4	4	2	3	2	3	1	3	1	2	3	2	1	1
Hungary	3	5	4	4	3	6	3	3	3	3	3	3	2	2	2	2
Ireland	3	1	2	2	2	3	2	2	2	2	2	2	2	2	1	2
Italy	3	4	3	3	2	3	2	2	2	2	2	2	3	2	2	2
Latvia	5	4	3	3	3	2	3	4	3	4	3	3	2	1	1	1
Lithuania	4	3	3	3	2	1	3	3	2	3	2	1	2	2	1	6
Luxemburg	3	4	2	2	2	3	3	2	2	2	2	2	1	1	1	
Malta	3	3	2	2	3	3	3	2	2	2	2	3	2	2	2	1
Netherlands	5	5	5	3	3	4	3	2	2	2	2	2	2	2	1	2
Poland	2	3	2	3	1	2	2	2	2	2	2	2	1	1	2	3
Portugal	2	2	3	3	3	2	2	2	2	2	2	1	1	3		2
Romania	3	3	2	1	1	2	2	1	1	1	1		2			2
Slovakia	4	4	3	3	3	4	4	2	2	2	2	2	2	1	1	2
Slovenia	2	5	4	4	2	3	3	2	1	1	1	2	3	1	3	3
Spain	3	4	3	3	3	4	3	2	2	2	2	2	2	4	2	3
Sweden	4	4	3	3	3	3	3	1	1	1	1	2	2	1	1	4
United Kingdom	3	4	2	4	4	5	4	2	2	2	2	4	2	4	1	2

Development of national broadband plans

Most Member States have gradually adopted national broadband plans (NBPs) since the adoption of the 'Digital Agenda for Europe' (DAE) 2020 targets — i.e. coverage of 30 Mbps download for all Europeans and take-up of 100 Mbps subscriptions by at least 50 % of European households. The plans are devised to integrate all relevant aspects of an effective broadband policy and resources, enabling policy makers and public authorities to properly plan any necessary public action in the telecommunications sector.

A large majority of Member States have started implementing their NBPs, albeit covering various time periods ranging from 2017 to 2022. Some NBPs are integrated within broader strategic approaches, while others are documents specifically dedicated to broadband deployment. In some countries, there are multiple official documents drafted by different national authorities, specifying aspects related to such broadband developments.

In accordance with the connectivity objectives for the gigabit society, by 2025 all European households, whether rural or urban, need to have access to internet connectivity offering a downlink of at least 100 Mbps (upgradable to Gbps). Only very few NPBs have so far been adjusted to reflect those objectives.

Content-wise, nearly all Member States' NBPs focus on reaching minimum download speeds — in most cases in terms of coverage (availability of commercial offer on a given territory) and sometimes also penetration (actual take-up in the form of internet access subscriptions). In contrast, emphasis on upload data rates is rather exceptional (e.g. in Denmark, Luxembourg or Ireland). In addition, operational measures to foster demand for digital applications and high-speed internet access are relatively infrequent.

Notably, some Member States have held consultations on their draft NBPs. These include the Czech Republic ('Digital Czech Republic'), France ('National Programme for Very High Speed Broadband') and Slovakia ('National Strategy for Broadband Access in the Slovak Republic[9]').

Some Member States (e.g. Sweden, the UK, France, Spain, Germany and Austria) have already started to adapt the targets of their NBPs to the new EU broadband targets for 2025 proposed by the Commission in its September 2016 Communication 'Connectivity for a Competitive Digital Single Market - Towards a European Gigabit Society'.

Broadband targets in national broadband plans

Although some NBPs **do not have targets** on penetration/take-up or **have set targets** on other features (e.g. upload speeds), the following general observations can be made:

- 11 Member States have set more ambitious objectives in their NBPs than the DAE-2020 targets (Austria, Belgium, Bulgaria, Denmark, Estonia, Finland, Germany, Hungary, Luxembourg, Slovenia and Sweden);
- 14 Member States' NBP objectives are convergent with the DAE-2020 targets (Croatia, Cyprus, Czech Republic, Greece, Ireland, Italy, Latvia, Lithuania, Malta, Netherlands, Poland, Portugal, Slovakia and Spain);
- 3 Member States have partly less ambitious objectives in their NBPs than the DAE-2020 targets (France, Romania and the UK) as regards at least one parameter (e.g. speed, end date).

Declared broadband targets in NBPs are, first and foremost, intended as a guide. Their practical feasibility and actual success will depend on the use of appropriate means including legal measures and financial resources. Therefore, it is important that Member States have the necessary resources and tools in place, rather than merely policy targets, to facilitate the actual roll-out of broadband infrastructure on their territories.

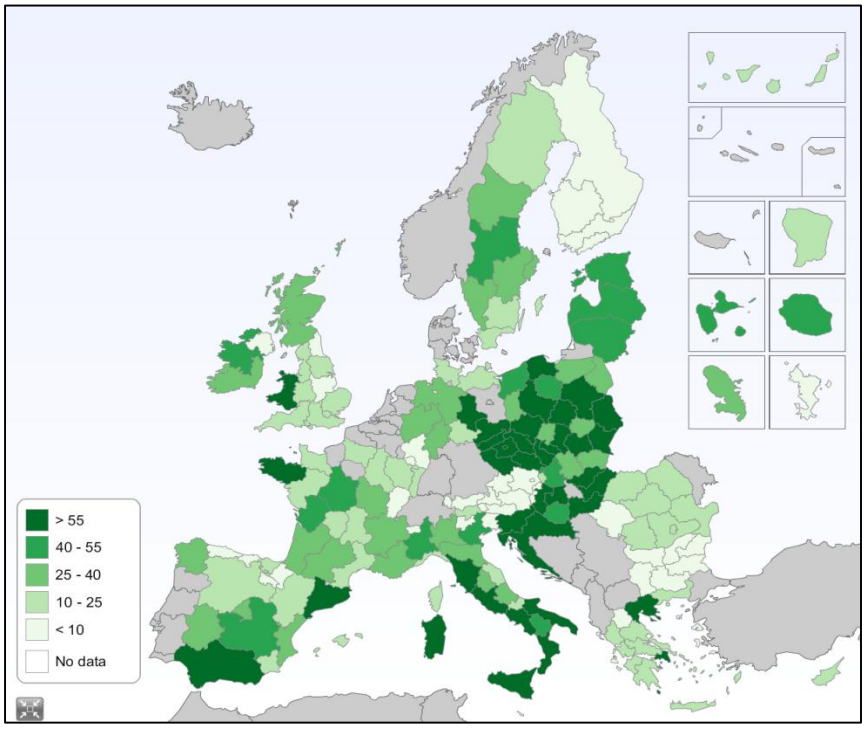
To facilitate the exchange of best practice between Member States on adapting their NBPs to the gigabit targets for 2025, in 2017 the Commission set up a Communications Committee working group on 5G. The working group should also identify common elements and best practices which can potentially become part of the revised NBPs.

[9] OECD countries which ran public consultation procedures before drafting their NBPs are: Canada ('Improving Canada's Digital Advantage'), Ireland ('Next Generation Broadband'), Japan ('Path of light'), and the US ('Connecting America: The National Broadband Plan').

Funding national broadband plans

In a number of cases, Member States decided to make extensive use of the European Investment and Structural Funds (ESIFs) for a total programmed amount of over EUR 6 billion by 2020. Member States' use focused particularly on the European Regional Development Fund (Poland and Italy more than EUR 1 billion) and the European Agricultural Fund for Rural Development (Italy EUR 273 million, Germany EUR 223 million and Sweden EUR 157 million). The roll-out of broadband projects remains challenging in many Member States and in specific regions, partly due to the lack of appropriate administrative capacity (e.g. for state aid notification, technological choices and business models). The Commission is working closely with Member States that envisage reallocating substantial parts of their initial programming from broadband measures to other sectors. To prevent reprogramming of this kind, in particular in rural areas, and to help improve technical assistance, the Commission has asked Member States to set up technically competent broadband competence offices and has put in place a broadband rural action plan. In addition, financial instruments including the ESIFs and the forthcoming Connecting Europe Broadband Fund are intended to maximise the leverage of public funding dedicated to the roll-out of the next generation of broadband networks.

Figure 1.70 ERDF and EAFRD programmed funds on broadband (2014-2020) — total €6 071 million



Source: European Commission, ICT monitoring Tool (http://s3platform.jrc.ec.europa.eu/ict-monitoring).

5G Observatory - progress towards 5G market introduction

5G trials

- More than 80 pre-commercial 5G trials and pilots launched in Europe as part of the industry's 5G trial roadmap,
- Seventeen Trial Cities appointed: Amsterdam, Barcelona, Bari, Berlin, Espoo, L'Aquila, London, Madrid, Malaga, Matera, Milan, Oulu, Patras, Prato, Stockholm, Tallinn and Turin,
- Five "digital cross-border corridors" established inter alia accommodating live tests of 5G for Cooperative Connected and Automated Mobility.

5G Spectrum plans

- 5G pioneer bands identified in Europe (700 MHz, 3.6 GHz and 26 GHz),
- Common roadmap for the availability of spectrum adopted by Member States,
- Consultations on spectrum assignments launched by a first set of Member States (e.g. Austria, Denmark, Italy, Germany, France, Finland, Portugal, Sweden, UK).

National 5G roadmaps

Three Member States have published national 5G roadmaps (Germany, Sweden, and the UK) and 3 have launched a public consultation (France, Poland, Spain):

- National calendars for key milestones set by the government,
- Measures to stimulate investments in 5G infrastructures such as: reducing the cost of deploying small cells; wide-ranging support to 5G trials,
- Promoting partnerships between the telecom sector and vertical industries,
- Foster public services as a lead user for early 5G deployment.

More information is available on the European 5G Observatory, which has been set up by the Commission to provide qualitative and quantitative information on

- Actual and expected market developments,
- Initiatives and preparatory actions taken by private and public actors in the area of 5G.

Member States' implementation of the Broadband Cost Reduction Directive (Directive 2014/61/EU).

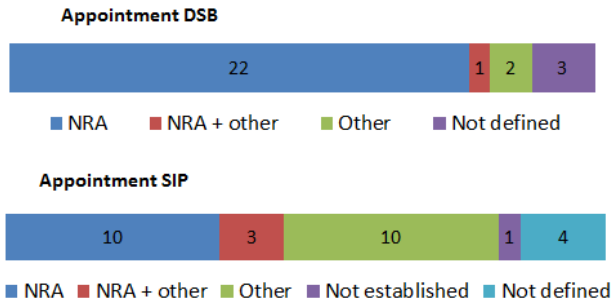
Directive 2014/61/EU (the Broadband Cost Reduction Directive) aims to facilitate and incentivise the roll-out of high-speed electronic communications networks by: (i) promoting the joint use of existing physical infrastructure; and (ii) enabling synergies across sectors for a more efficient deployment of new physical infrastructure. The overall aim is for high-speed networks

to be rolled out at a lower cost. Member States had until 1 January 2016 to transpose the Directive into national law. After significant time lags, most Member States have achieved this. The case against Belgium is still pending before the Court of Justice.

The fact that most Member States were late in transposing the Directive and have only recently achieved its full implementation means that transposition measures are only slowly starting to produce results. More tangible results can nevertheless be seen in those countries that had pre-existing legislation in place and that partially went well beyond certain requirements of the Directive (such as on mapping and in-house equipment).

The Directive also requires Member States to appoint one or more independent dispute settlement bodies ('DSBs') and one or more bodies to act as single information point ('SIP').

Figure 1.71 Tasks laid down in the Broadband Cost Reduction Directive appointed to NRAs in the EU



Source: Body of European Regulators for Electronic Communications (BEREC)

The tasks of the **dispute settlement body** were allocated to the national regulatory authority or partially to the NRA in most of the Member States and to other organisations only in two Member States.

In several countries, the NRA already had tasks to fulfil as DSB before the entry into force of the Broadband Cost Reduction Directive. An increase in the number of disputes can be observed since the application of the Directive. The most important challenges the NRAs have faced as DSB so far relate to: (i) setting the price for access to existing physical infrastructure; (ii) the appropriation of costs for coordination of civil works and: (iii) (un)justified refusal of access to existing physical infrastructure.

In several Member States, NRAs have also started developing rules or guidelines on dispute settlement (e.g. the process the NRA is likely to follow in resolving disputes). These may enhance legal certainty and overcome the general reluctance of the stakeholders involved.

The tasks of the **single information point** were allocated to the NRA (or partially to the NRA) in 14 Member States. In 10 Member States other organisations are in charge of performing this function: in most cases this is a ministry.

The Directive provides for the possibility to require all public-sector bodies to make minimum information they are holding on existing physical infrastructure available via the SIP. Several Member States have imposed such an obligation on public-sector bodies and some Member States have also obliged other organisations, for instance network operators, to make available information via the SIP.

The main challenges NRAs were faced with as SIP relate to collecting the data and the information which has to be provided, and on how to incentivise those who have to provide information to meet this obligation.

Long delays in permit granting, in particular for mobile network roll-out, also still pose a challenge in many Member States.

Widespread use of roam like at home across Member States since 15 June 2017

Since 15 June 2017, mobile operators in the EU/EEA are not allowed to levy any roaming surcharges for any fair usage of roaming services by their customers ('roam like at home', RLAH), except in a few cases duly authorised by national regulators to avoid any increase in domestic prices (see below on sustainability derogations).

We observe broadly successful implementation of the new roaming rules, overall consumer satisfaction and a considerable rise in travellers' roaming data consumption, as well as substantial increases in roaming voice calls since 15 June 2017. According to the last BEREC International Roaming Benchmark Report, despite the introduction of RLAH, the average retail revenue per user slightly increased in most Member States in Q3 2017 (first RLAH quarter) compared to Q2 2017.

NRAs have the responsibility to monitor and enforce EU roaming rules in the Member States. It is therefore necessary that all Member States have equipped them with the appropriate powers to penalise non-compliance with the rules.

According to the last BEREC International Roaming Benchmark Report, more than 95 % of EU/EEA subscribers are roaming-enabled. Almost 90 % of them benefit from RLAH. Less than 9 % are on an alternative roaming tariffs.

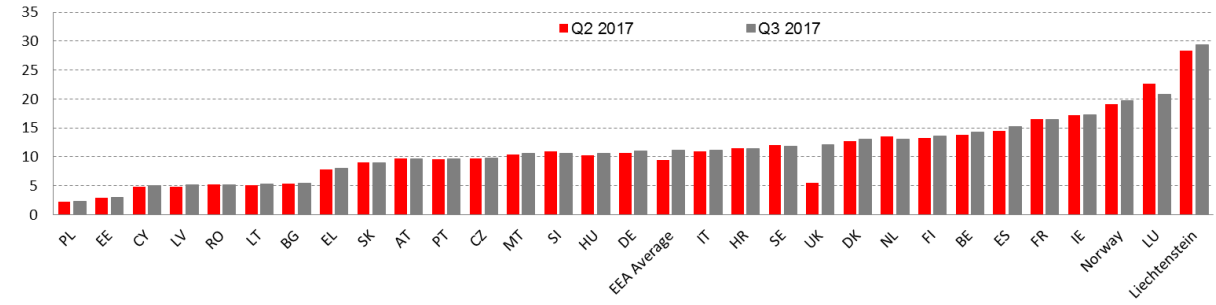
Sustainability derogations have been granted by national regulators to operators falling in categories which were foreseen to be likely candidates for the derogation, i.e. some mobile virtual network operators in several Member States and some mobile network operators in some

of the very low-data-price Member States with high roaming imbalances and/or low revenues per user (Estonia, Lithuania, Finland). Even in the latter countries, more than 70 % of subscribers benefit from RLAH. In total, less than 2 % of EU/EEA subscribers are subject to a small roaming surcharge due to a derogation (RLAH+).

According to the last BEREC International Roaming Benchmark Report, on average in the EU/EEA roaming traffic was multiplied by 5.3 and 2.4 respectively for data and voice in Q3 2017 compared to Q3 2016. The increase in outbound roaming traffic was particularly high for operators in Poland, Romania, Latvia, Bulgaria, Croatia and Slovenia.

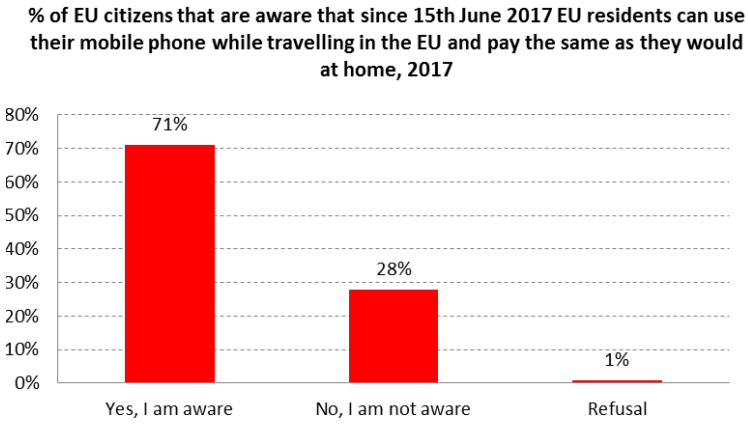
According to a recent Eurobarometer survey, at the end of August 2017 more than 70 % of EU citizens were aware that roaming charges ended on 15 June 2017 and thought that people will benefit from it. At that time, the impact on travellers' behaviour was already noticeable, with a doubling of the share of travellers using voice calls and data abroad like at home after 15 June 2017.

Figure 1.72 Domestic mobile service: monthly retail revenue per subscriber (ARRPU), EUR, Q2 and Q3 2017



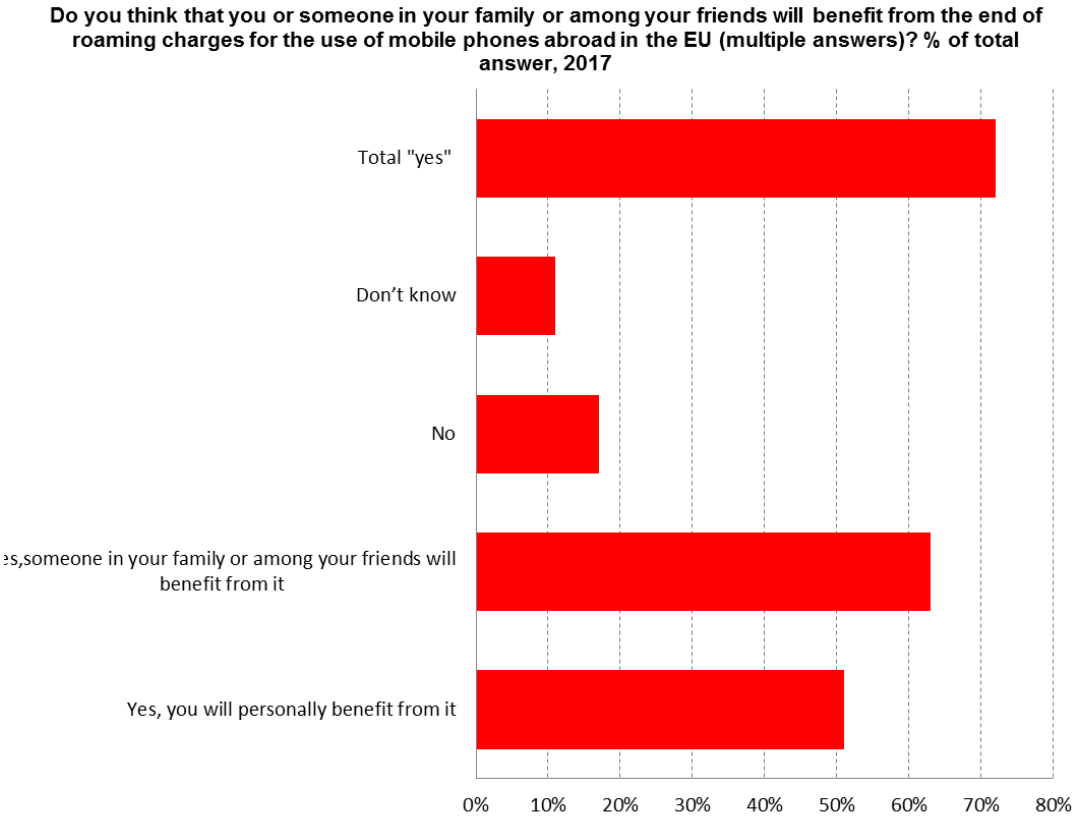
Source: 20th BEREC International Roaming Benchmark Report (March 2018)

Figure 1.73 Roam like at home - awareness



Source: Eurobarometer

Figure 1.74 Roam like at home - benefits



Source: Eurobarometer

Member States' implementation of the net neutrality rules (Regulation (EU) 2015/2120)

Under the EU net neutrality rules, Europeans must have access to the online content and services they wish, regardless of where this content originates from or is stored. These rights are established by directly applicable EU legislation and cannot be changed by mere administrative decision.

Specific BEREC guidelines and close cooperation between NRAs, BEREC and the Commission contribute to a consistent application of the rules throughout the EU.

Net neutrality issues

Many NRAs have started to analyse individual commercial offers emerging on the market on a case-by-case basis. Several NRAs launched investigations regarding zero-rating services and assessed them according to the BEREC guidelines. Some NRAs (e.g. in Germany, Hungary, Italy, Sweden, [Portugal]) found that the investigated zero-rating practice was in breach of Regulation 2015/2120, because it was accompanied by unlawful traffic management practices.

Several NRAs (e.g. in Belgium, Estonia and Latvia) found that the investigated zero-rating practice was compliant with the Regulation.

The business models on zero-rating services adopted by many EU operators have been generally open, without discriminating between specific content providers in a given category.

Other practices relevant from a net neutrality perspective were also identified: blocking of ports, availability of private IP addresses, video on demand as a specialised service, altering/routing of traffic, different treatment of traffic, use of deep packet inspection, free choice of modems and interruption of IP connections.

Net neutrality annual reports

Under Article 5 of Regulation (EU) 2015/2120 national regulatory authorities are required to publish annual reports on their monitoring and findings and to share these reports with the Commission. The annual country reports on open internet from national regulators covering 2017 are available at:

https://ec.europa.eu/digital-single-market/en/news/annual-country-reports-open-internet-national-regulators-2017

Net neutrality penalties

Article 6 of Regulation (EU) 2015/2120 stipulates that 'Member States shall lay down the rules on penalties applicable to infringements of Articles 3, 4 and 5'. The deadline to notify the Commission of these rules and measures was 30 April 2016.

By mid-February 2018 the Commission had received notifications in this regard from 22 Member States.

Penalties are in place in another three Member States (Croatia, Czech Republic, Italy), but these were not notified to the Commission.

In three Member States (Austria, Ireland and Portugal) there are as yet no penalties related to net neutrality.

Sanctioning power of NRAs

Most NRAs (e.g. in Belgium, Germany, Denmark, Finland, France, Greece, Hungary, Italy, Luxembourg, Latvia, Malta, Poland, Slovenia, Sweden, Slovakia and the UK) can impose such fines and penalty payments directly. There are only a few exceptions (e.g. Ireland).

Transparency measures

Several NRAs have adopted measures on the transparency obligations set out in the Regulation (for example: in Germany, Hungary and Lithuania)

The EETT in Greece is currently preparing a decision with more specific requirements for the implementation of Regulation (EU) 2015/2120. The decision will include requirements on the estimation of speeds, zero-rating and information transparency.

ANACOM in Portugal is considering preparing in 2018 some recommendations or communications to operators in order to support or improve implementation of the transparency measures in Article 4.

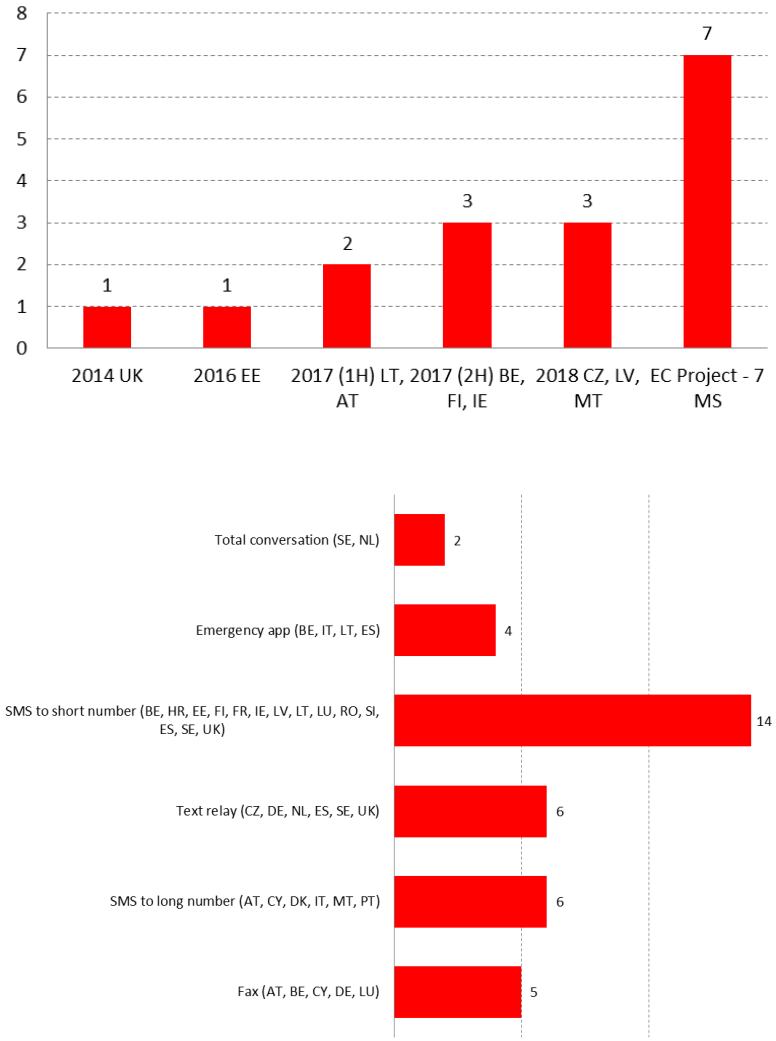
Emergency communications and the single European emergency number 112

Main findings based on the 2018 report on the implementation of the European emergency number 112:

- The advanced mobile location (AML) handset-based caller location solution was launched in Belgium, Finland and Ireland, raising the number of AML countries to seven. Currently AML is deployed in Austria, Belgium, Estonia, Finland, Ireland, Lithuania and the UK. To boost the take-up of AML for the benefit of the public and emergency services, the European Commission launched in September 2017 a project to deploy AML in a further seven Member States in the next 2 years. AML provides an accuracy well below 100 m, which makes it possible to provide emergency assistance in good time.
- In the reporting period AML was available only on phones with an Android operating system. As of spring 2018, Apple will also support AML as of the next update of iOS.
- 24 Member States reported implementing an alternative access to emergency services for users with disabilities. SMS to a long or short number is implemented in 20 Member States. User location for alternative means of access is available in only 10 Member States.
- According to the latest Eurobarometer e-communications household survey, almost half of EU citizens (49 %) identified 112 as the single number to call throughout the EU. This is a 1pp. increase since 2015 and 7pps since 2014.

The Commission services are looking into the matter of the timely provision of caller location information and accessibility solutions for people with disabilities in several Member States.

Figure 1.75 AML deployment and accessibility solutions for disabled end-users



Source: Implementation of the European emergency number 112