Connectivity
Broadband market developments in the EU

The Digital Economy and Society Index (DESI) is a composite index that summarises relevant indicators on Europe's digital performance and tracks the progress of EU Member States in digital competitiveness.

Finland, Sweden, the Netherlands and Denmark, have the most advanced digital economies in the EU followed by the UK, Luxembourg, Ireland and Estonia.

Bulgaria, Romania, Greece and Poland have the lowest scores on the index.

The five dimensions of the DESI

1 Connectivity	Fixed broadband, mobile broadband, fast and ultrafast broadband and prices
2 Human capital	Internet user skills and advanced skills
3 Use of internet	Citizens' use of internet services and online transactions
4 Integration of digital technology	Business digitisation and e-commerce
5 Digital public services	e-Government and e-health

Digital Economy and Society Index (DESI) 2019

Legend: ■ 1 Connectivity ■ 2 Human capital ■ 3 Use of internet services ■ 4 Integration of digital technology ■ 5 Digital public services

Source: DESI 2019, European Commission

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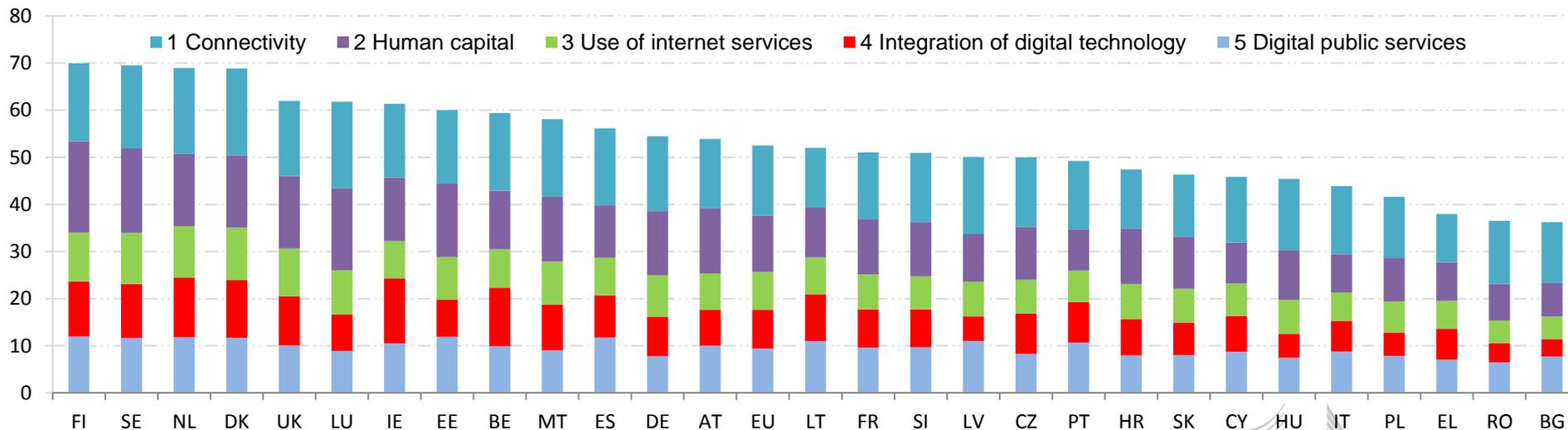
European Commission

In **Connectivity**, Denmark had the highest score, followed by Luxembourg, the Netherlands, Sweden and Finland. Greece, Croatia and Lithuania had the weakest performance in this dimension of the DESI.

The connectivity dimension looks at both the demand and the supply side of fixed and mobile broadband. Under fixed broadband, it assesses the availability as well as the take-up of basic, fast (Next Generation Access – NGA providing of at least 30 Mbps) and ultrafast broadband (at least 100 Mbps) and also considers the prices of retail offers. Mobile broadband includes the availability of 4G, the take-up of mobile broadband and a new indicator on 5G readiness. Digital connectivity is considered a social right in the EU.*

A comparative assessment of fixed broadband (basic, fast and ultrafast) shows the Netherlands and Luxembourg as the best performers. In contrast, Greece, Poland and Croatia are shown to be among the worst performers.

As for mobile broadband, Finland, Denmark, Latvia and Italy lead Europe, while Romania and Hungary registered the lowest scores. https://composite-indicators.jrc.ec.europa.eu/social-scoreboard/

* https://composite-indicators.jrc.ec.europa.eu/social-scoreboard/

Connectivity indicators in DESI 2019	EU
1a1 Fixed broadband coverage	**97%**
% households	2018
1a2 Fixed broadband take-up	**77%**
% households	2018
1b1 4G coverage	**94%**
% households (average of operators)	2018
1b2 Mobile broadband take-up	**96**
Subscriptions per 100 people	2018
1b3 5G readiness	**14%**
Assigned spectrum as a % of total harmonised 5G spectrum	2018
1c1 Fast broadband (NGA) coverage	**83%**
% households	2018
1c2 Fast broadband take-up	**41%**
% households	2018
1d1 Ultrafast broadband coverage	**60%**
% households	2018
1d2 Ultrafast broadband take-up	**20%**
% households	2017
1e1 Broadband price index	**87**
Score (0 to 100)	2017

Digital Economy and Society Index (DESI) 2019, Connectivity

Legend: 1a Fixed broadband · 1b Mobile broadband · 1c Fast broadband · 1d Ultrafast broadband · 1e Broadband price index

Countries (left to right): DK, LU, NL, SE, FI, BE, MT, LV, ES, UK, DE, IE, EE, HU, EU28, CZ, AT, SI, PT, IT, FR, CY, RO, SK, PL, BG, LT, HR, EL

*Source: DESI 2019, European Commission*
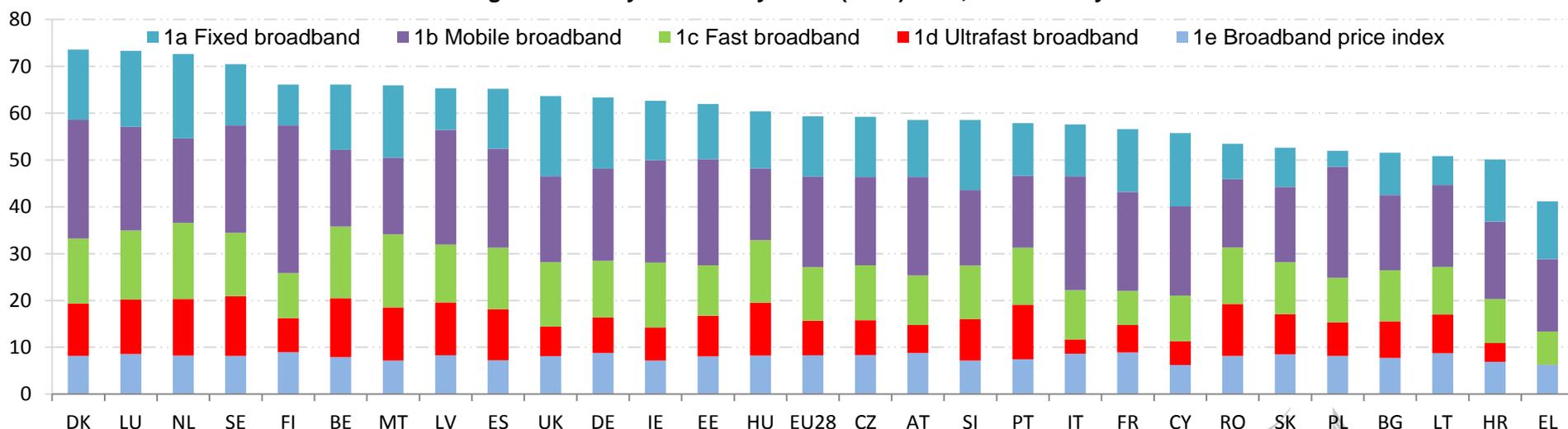
European Commission

Total telecoms services revenues have stagnated in Europe since 2015. **Mobile and fixed voice revenues** have fallen by 16 % since 2014. An increase in **mobile data and internet services** was accompanied by a decline in voice services (fixed and mobile).

Telecoms operators in Europe generated less revenue than the US operators. Revenues fell from EUR 213.8 billion in 2015 to EUR 213.4 billion in 2018 in Europe. At the same time, the US revenues increased by 2.7 % from EUR 286 billion to EUR 293 billion, despite its smaller population.

China saw its revenues increased by 16 %, rising from EUR 156 billion in 2015 to EUR 182 billion in 2018.

Note: This analysis is based on detailed figures from 26 EU Member States, which covered around 98% of the total EU market (total telecom carrier services). Data is not available for Malta and Cyprus.

**Total Telecommunication revenues per region, billion EUR, 2015-2019 (forecast)**
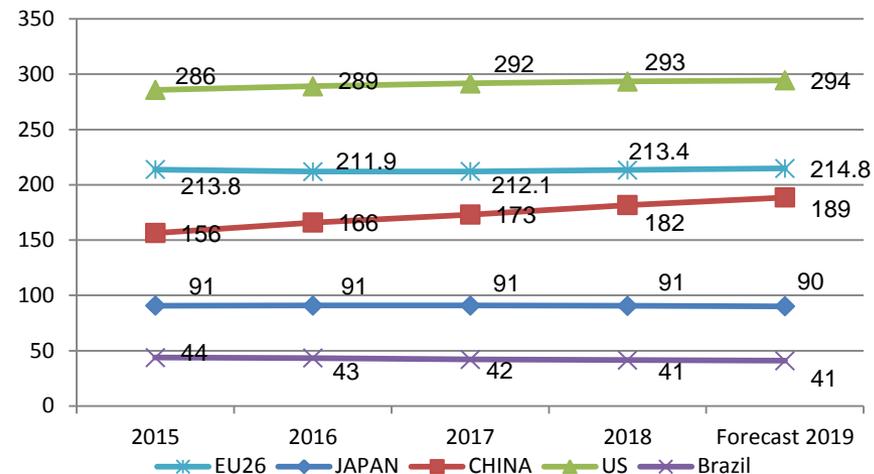
The analysis of telecoms revenues (carrier services) by segment shows a decline in voice services (both fixed and mobile) revenues. Fixed voice service revenues have fallen by 11.4 % since 2015, compared to 11.6 % for mobile services over the same period (2015 – 2018). Together, fixed and mobile voice services represented 43 % of total telecoms revenues in 2018, compared with 49 % in 2015.

Mobile data services represented 28 % of total revenues in 2018, up from 25 % in 2015. The growth in mobile data services was accompanied by a decline in voice services.

Note: This analysis is based on detailed figures from 26 EU Member States, which covered around 98% of the total EU market (total telecom carrier services). Data is not available for Malta and Cyprus.

Source: 2019 European IT Observatory (EITO) in collaboration with IDC.

Telecoms services revenues by segment, % of total, 2015 - 2019 (forecast)

European Commission

Broadband coverage: Fast broadband (Next generation access - NGA) covers 83 % of homes, up from 79 % a year ago, while Ultrafast broadband (Fibre to the Premises and Docsis 3.0 cable) is available in 60 %, up from 57 % a year ago. 4G mobile is almost universal at 99 %. Rural coverage improved substantially in 4G, VDSL and FTTP.

Basic broadband is available to all homes in the EU, when considering all major technologies (xDSL, cable, fibre to the premises - FTTP, WiMax, HSPA, LTE and satellite). Fixed and fixed-wireless technologies cover 97 % of EU homes.

Coverage of NGA technologies (VDSL, cable Docsis 3.0 and FTTP) capable of delivering download speeds of at least 30 Mbps reached 83 %, thanks to an increase of 3 percentage points in VDSL and FTTP last year.

DSL coverage has somewhat declined, as DSL is being replaced by FTTP or mobile.

30 % of homes already benefit from very high capacity broadband with gigabit connectivity on FTTP networks.

Rural areas remain challenging, as 13 % of homes are not covered by any fixed network and 48 % by any NGA technology. Rural fixed coverage is stable at 87%. Mobile broadband availability went up slightly last year, although mobile is still mainly used as a complementary technology rather than a substite to fixed technologies.

Note: Substantial revisions have been made in the dataset concerning in particular the rural indicators.

Total coverage by technology at EU level (% of homes), 2017-2018

Legend: 2017, 2018

Categories: Fixed & mobile, Fixed, NGA, FTTP & Docsis 3.0, DSL, VDSL, FTTP, WiMAX, Standard cable, Docsis 3.0 cable, HSPA, 4G, Satellite

Source: IHS and Point Topic

Rural coverage by technology at EU level (% of homes), 2017 - 2018

Legend: 2017, 2018

Categories: Fixed & mobile, Fixed, NGA, FTTP & Docsis 3.0, DSL, VDSL, FTTP, WiMAX, Standard cable, Docsis 3.0 cable, HSPA, 4G, Satellite

Source: IHS and Point Topic

European Commission

Fixed broadband coverage remained at 97 %. In 10 Member States more than 99 % of homes are covered. Poland, Lithuania, Romania and Slovakia are lagging behind with less than 90 % of homes covered.

Primary internet access at home is provided mainly by fixed technologies. Among these technologies, xDSL has the largest footprint (92 %) followed by cable (45 %) and WiMAX (17 %). Fixed coverage is the highest in the Member States with well-developed DSL infrastructures.

Overall coverage of fixed broadband has only marginally increased since 2011. Rural coverage improved from 80 % in 2011 to 87 % in 2018.

Fixed broadband coverage in the EU (% of homes), 2011 - 2018

Source: IHS, VVA and Point Topic

Fixed broadband coverage (% of homes), mid-2018

Source: IHS and Point Topic

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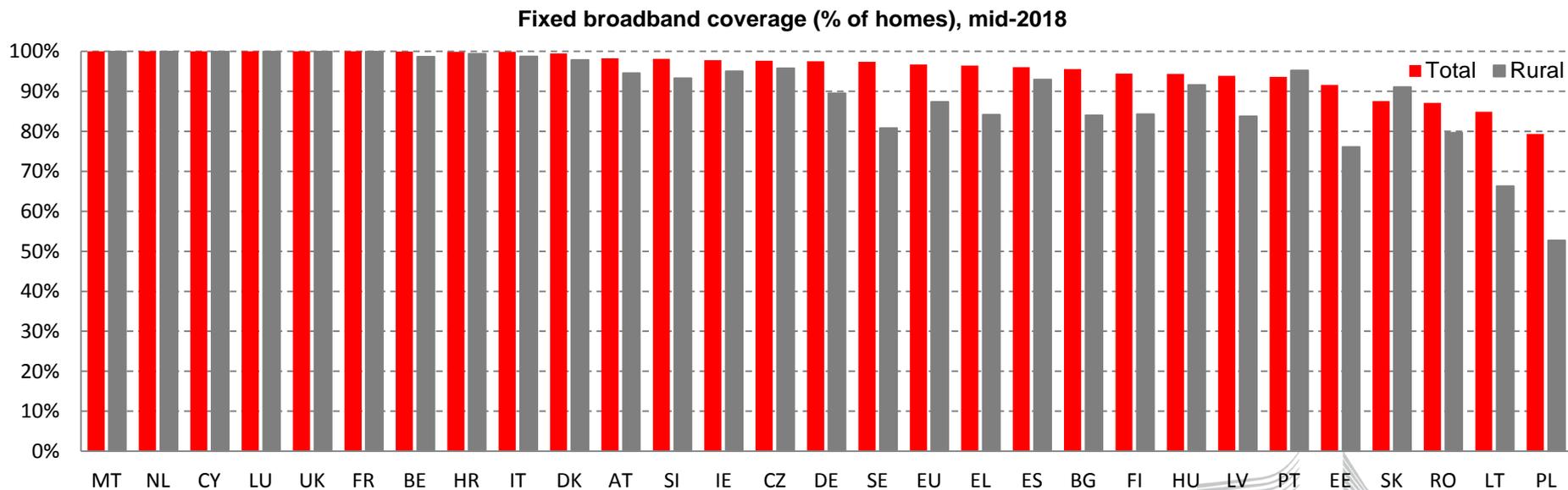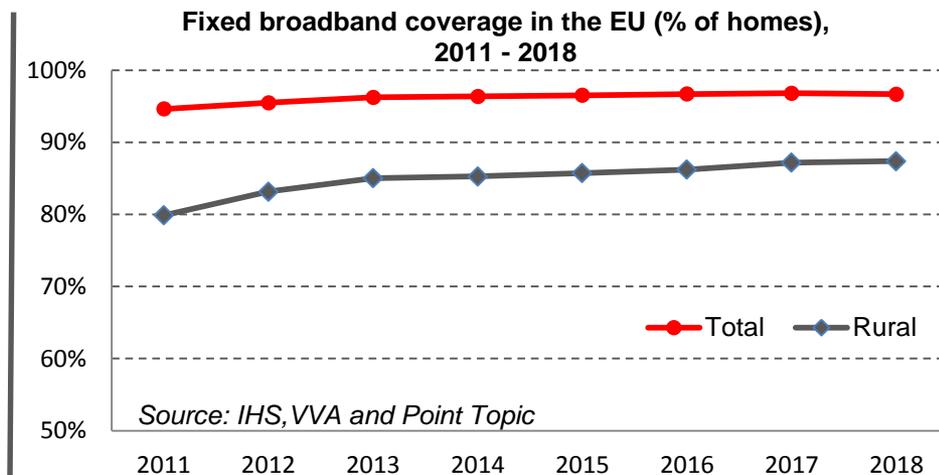
Coverage of Next Generation Access (NGA) technologies continued to increase and reached 83 %. NGA improved significantly in rural areas, from 45 % to 52 % of homes compared to last year.

By mid-2018, VDSL had the largest NGA coverage at 57 %, followed by cable (44 %) and FTTP (30 %). While cable coverage only marginally increased last year, VDSL and FTTP went up by 3 percentage points.

Malta, the Netherlands and Belgium are the leaders in NGA. In 11 Member States fast broadband is available to at least 90 % of homes. On the other hand, in France, Lithuania, Greece and Poland less than two thirds of homes can have access to such networks.

Next Generation Access (NGA) broadband coverage in the EU (% of homes), 2011 - 2018

Source: IHS, VVA and Point Topic
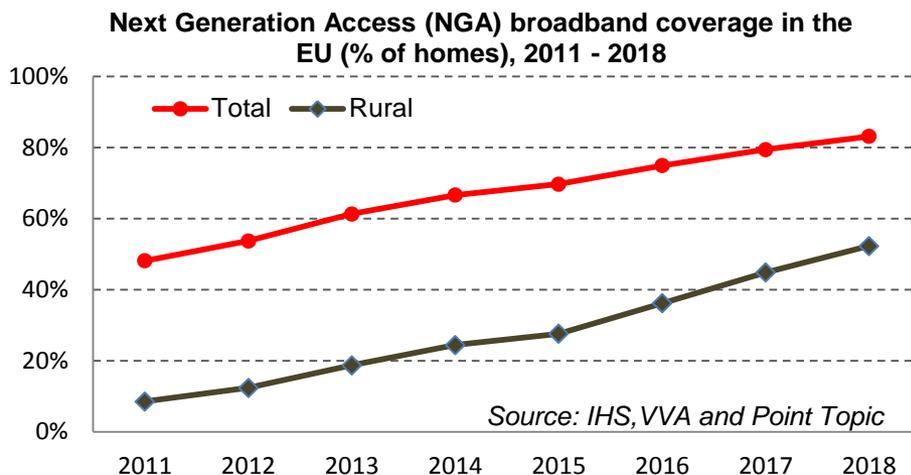
NGA coverage (% of homes), mid-2018

Source: IHS and Point Topic

European Commission
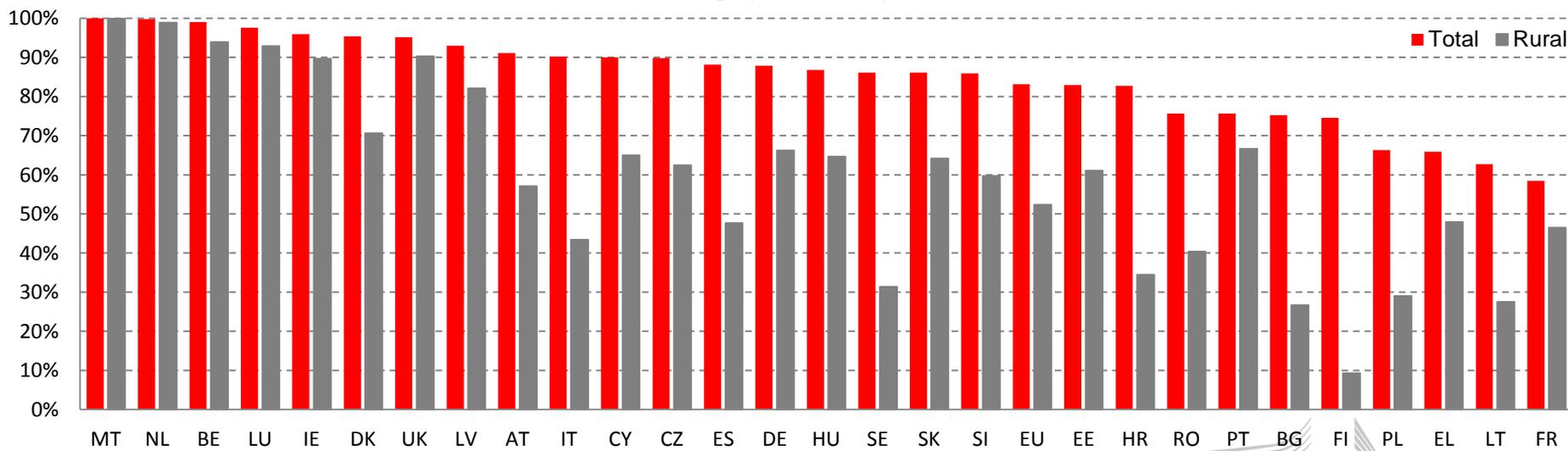
Ultrafast broadband (FTTP & Cable Docsis 3.0) is available in 60 % of European homes. In Malta, the Netherlands, Belgium, Denmark and Luxembourg at least 90 % of homes have access, while in Greece it is less than 1 %.

Ultrafast broadband capable of providing at least 100 Mbps connectivity is currently measured as the combined coverage of cable Docsis 3.0 and FTTP networks. Cable covers 44 %, while FTTP covers 30 % of homes. Cable and FTTP networks overlap, and mainly cover urban areas. 60 % of homes in total have access to at least one of the ultrafast technologies, up from 57 % a year ago.

The rural coverage of ultrafast technologies stands at 16 % of homes.

The top three countries (Malta, the Netherlands and Belgium) provide ultrafast connectivity mainly through cable, while FTTP is the more widespread ultrafast technology in Latvia and Spain. At the bottom of the list, Greece has no cable and only a marginal availability of FTTP, while Italy only has FTTP available in some cities.

Ultrafast coverage (FTTP and Docsis 3.0., % of homes), mid-2018

Source: IHS and Point Topic

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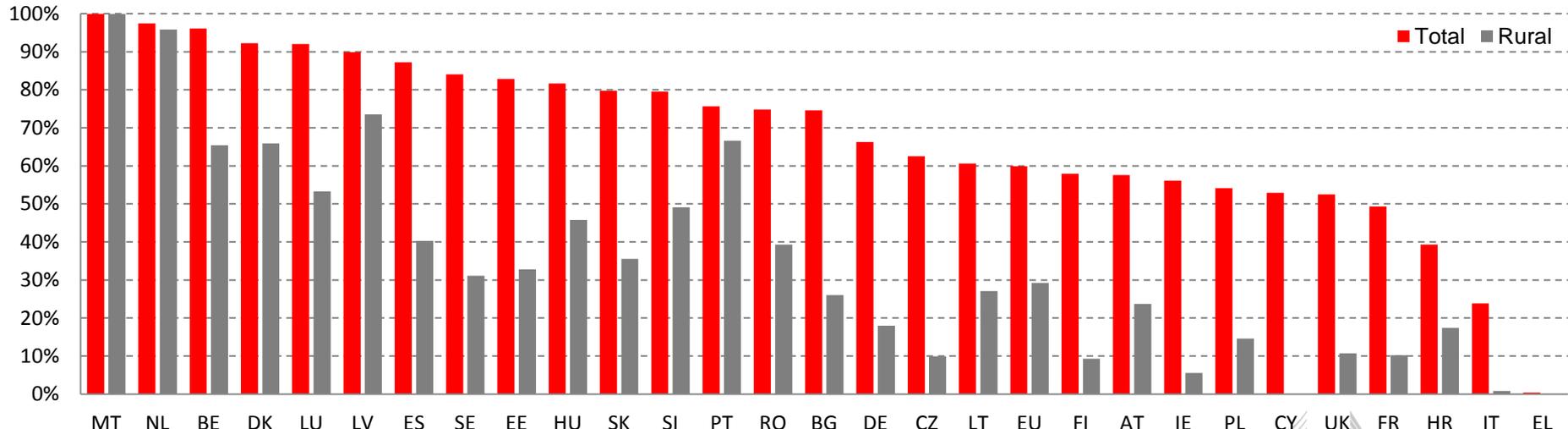
Coverage of Fibre to the Premises (FTTP) grew from 10 % in 2011 to 30 % in 2018, although it remains a primarily urban technology. Latvia, Spain, Sweden, Portugal and Slovakia are the leaders in FTTP in Europe.

FTTP is catching up in Europe, as coverage of homes has tripled since 2011. However, the FTTP footprint is still significantly lower than that of cable Docsis 3.0 and VDSL. In Latvia, Spain and Sweden more than 70 % of homes can already subscribe to FTTP services, while in Greece, Cyprus, Belgium, the UK and Germany less than 10 % can do so. FTTP increased the most in Slovakia (13 percentage points) and in France (10 percentage points). FTTP services are available mainly in urban areas with the exception of Latvia and Denmark, where more than 50 % of rural homes also have access to it.

Fibre to the Premises (FTTP) coverage in the EU (% of homes), 2011 - 2018

Source: IHS,VVA and Point Topic

FTTP coverage (% of homes), mid-2018

Source: IHS and Point Topic

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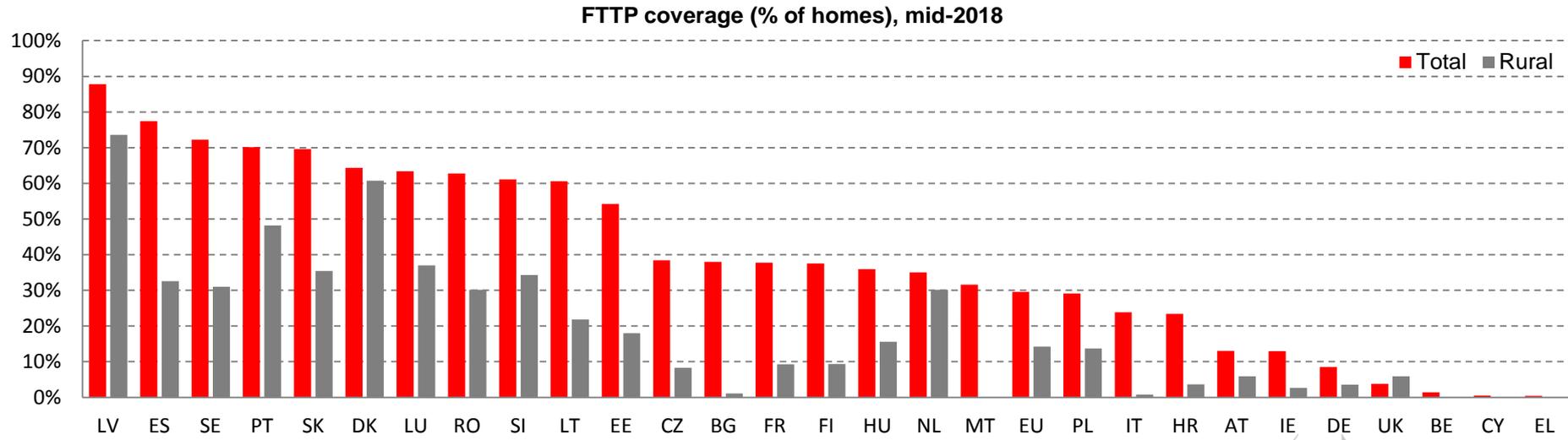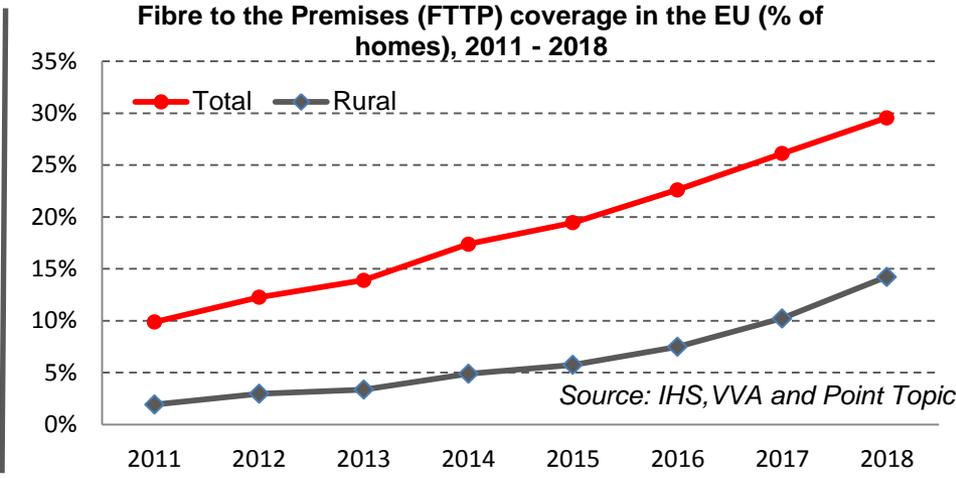
Overall fixed broadband and NGA broadband coverage by region.

Europe: Overall fixed broadband coverage, 2018

0 %- <75 %
75%- <90%
90%- <95%
95%- <100%
100%

Source: Broadband Coverage in Europe 2018, a study by IHS Markit for the European Commission

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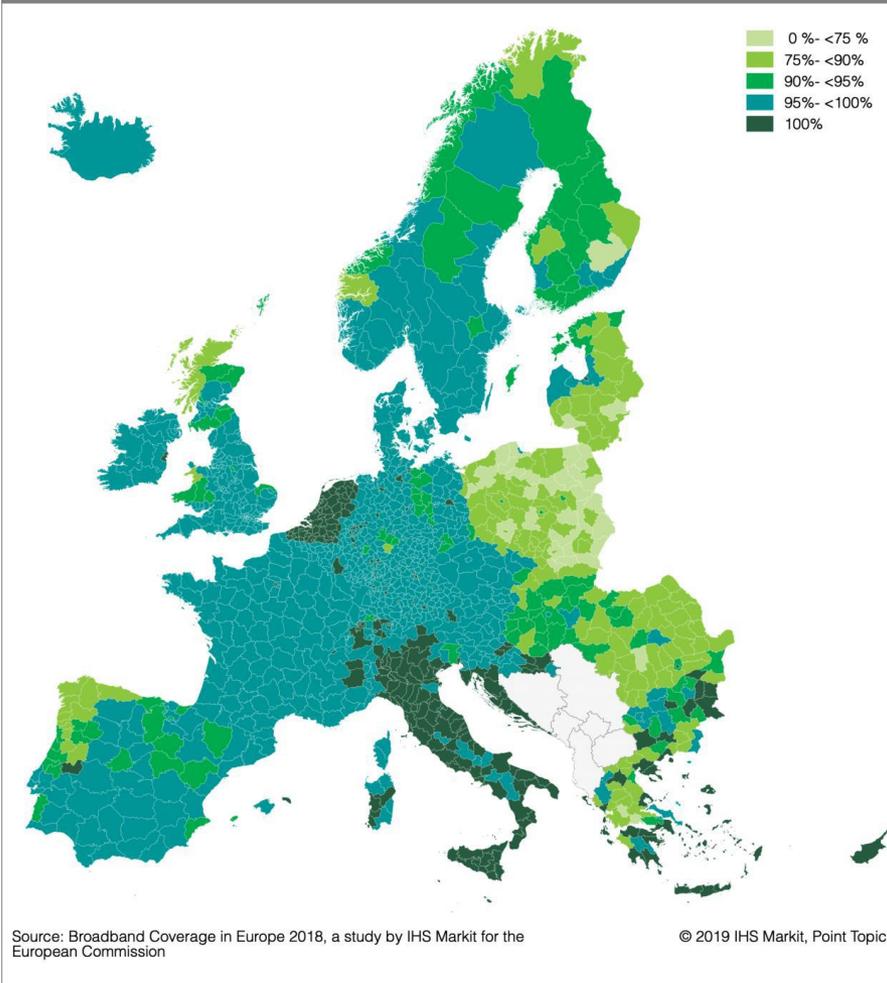
Europe: Overall NGA broadband coverage, 2018

0 %- <35 %
35%- <65%
65%- <95%
95%- <100%
100%

Source: Broadband Coverage in Europe 2018, a study by IHS Markit for the European Commission

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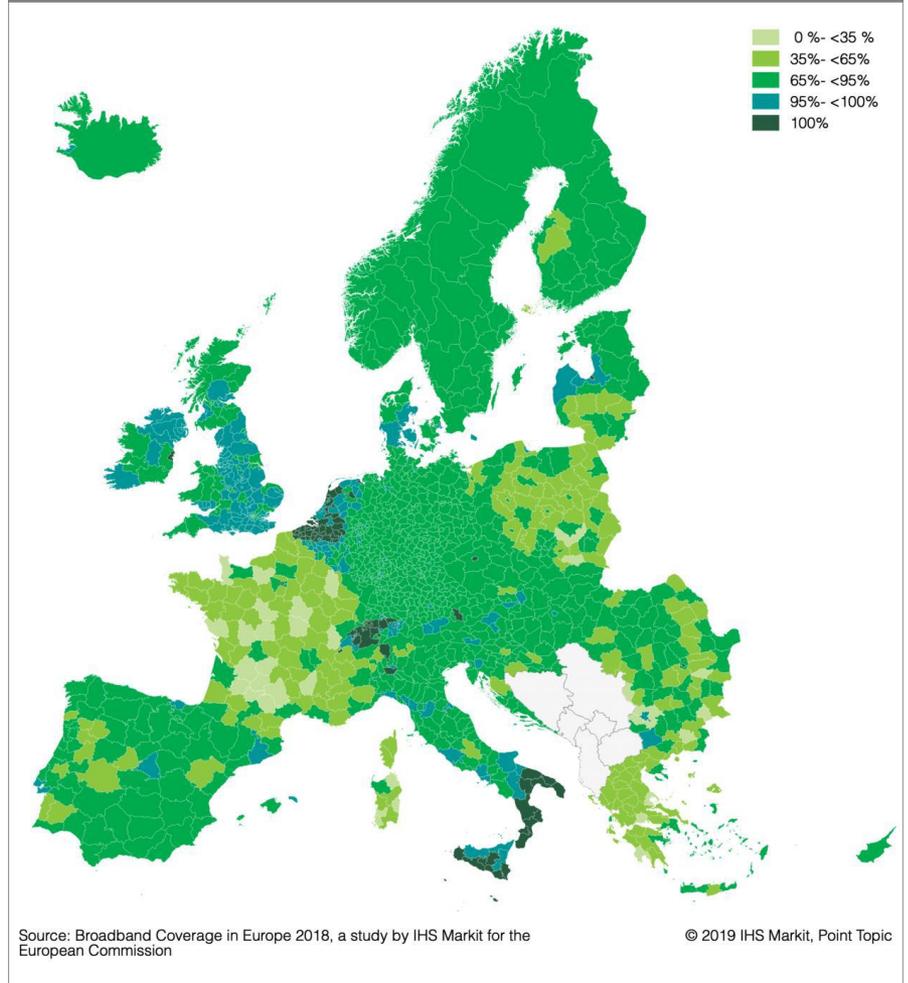
4G coverage: 99 % of homes are covered by at least one operator in Europe (overall coverage). Rural coverage went up from 38 % in 2014 to 96 % in 2018. Average 4G availability* is 94 %, up from 85 % two years ago.

4G (LTE) is now almost as widely available as advanced 3G (HSPA) and fixed broadband. 4G expanded mainly in Croatia and Cyprus last year.

Average 4G availability (calculated as the average of each operator's coverage) is somewhat below the overall coverage and stands at 94 %.

**4G mobile coverage in the EU (% of homes), 2011 - 2018**

Source: IHS, VVA and Point Topic

4G coverage (% of homes), mid-2018

Source: IHS and Point Topic
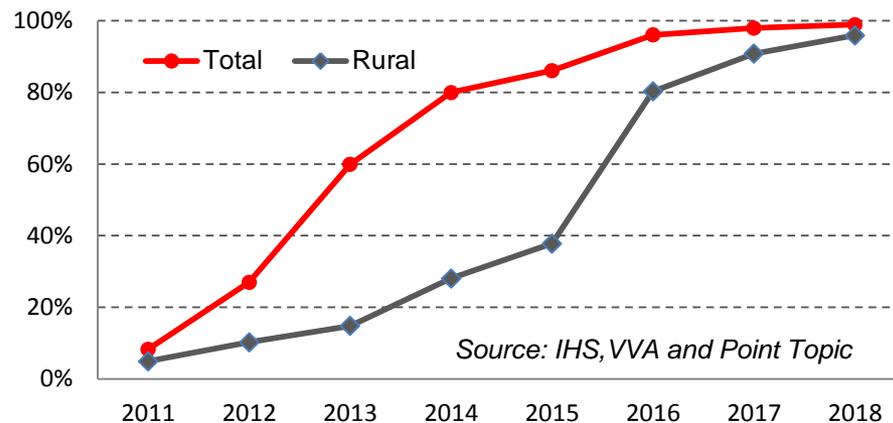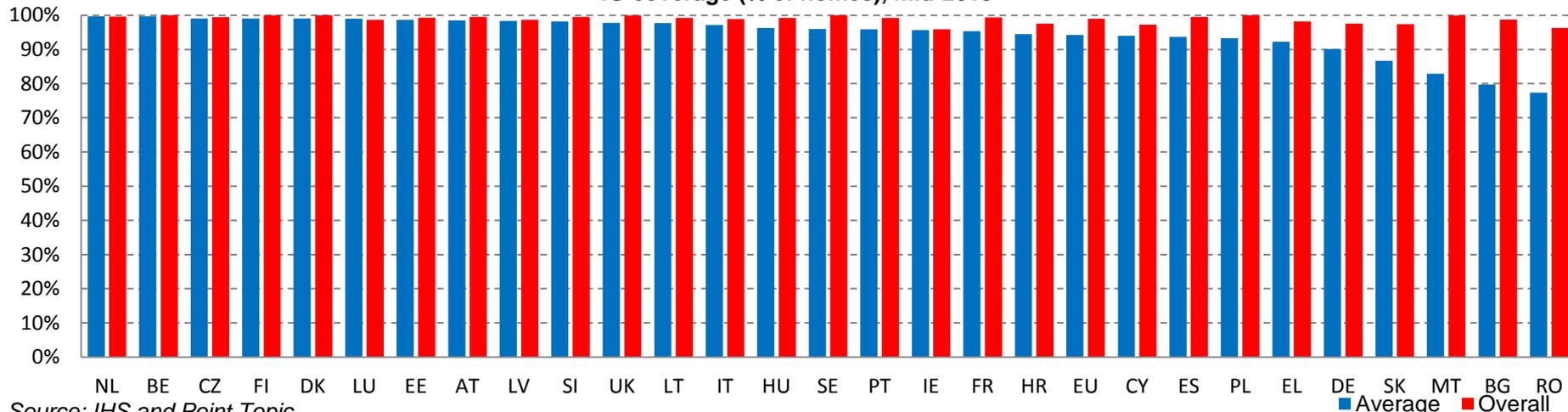
This indicator measures the average of mobile telecom operators' coverage within each country.

European Commission

77 % of EU homes had a fixed broadband subscription in 2018. The Netherlands, the UK, Luxembourg and Germany registered the highest figures, while Bulgaria, Finland, Poland, Latvia and Italy had the lowest take-up rates.

Although fixed broadband is available to 97 % of EU homes, 23 % of homes do not have such a subscription. Growth in take-up has been steady over the last 6 years, up from 67 % to 77 %.

Take-up rates ranged from only 58 % in Finland and Bulgaria to 97 % in the Netherlands. The relatively low take-up rates in Finland, Poland, Latvia and Italy may partly be due to fixed-mobile substitution.

Households with a fixed broadband subscription (% of households), 2012-2018
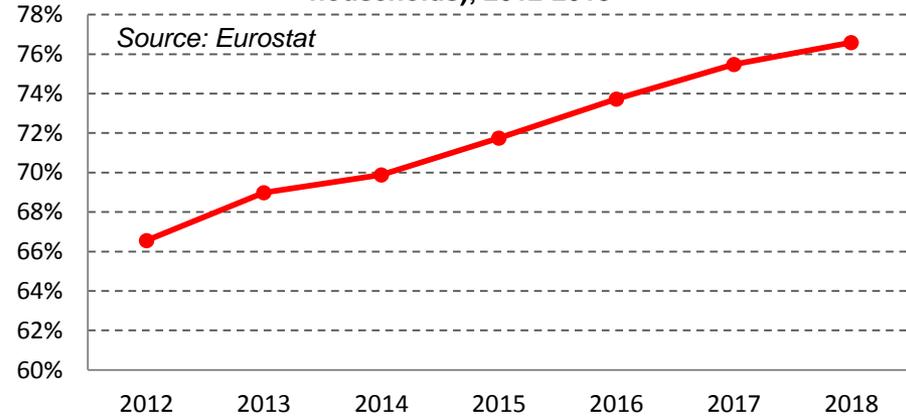
Source: Eurostat

Households with a fixed broadband subscription (% of households), 2018*

Source: Eurostat

*The figures for Belgium were removed due to low data reliability.

European Commission
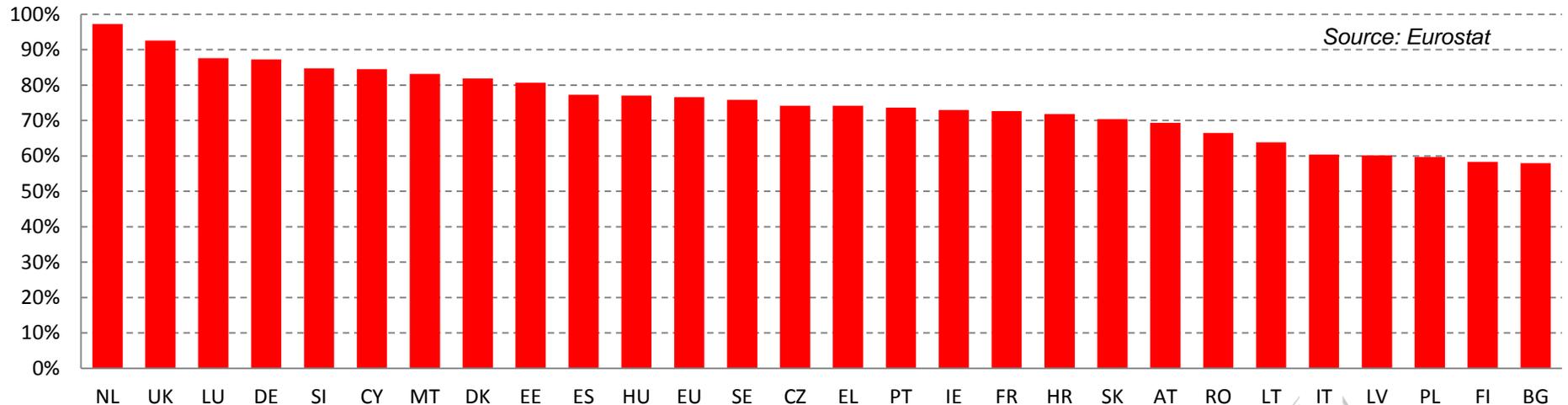
70 % of **rural homes** in the EU had a **fixed broadband subscription** in 2018. The Netherlands, the UK and Luxembourg registered the highest figures, while in Bulgaria and Latvia, less than half of rural homes subscribed.

There is a substantial gap between rural and national penetration rates. However, this gap slightly decreased from 11 percentage points in 2010 to 7 percentage points in 2018.

In the Netherlands, the UK, Luxembourg, Germany, Denmark, Belgium, Czechia and Austria, rural and national penetration rates are identical or almost identical.

However, in Bulgaria, Latvia, Romania, Lithuania, Portugal, Ireland, Greece, Slovakia and Spain, where fixed rural take-up is relatively low (63 % and below), there are significant gaps of 11-17 percentage points between rural and national take-up.

EU households with a fixed broadband connection by degree of urbanisation (% of households), 2010-2018
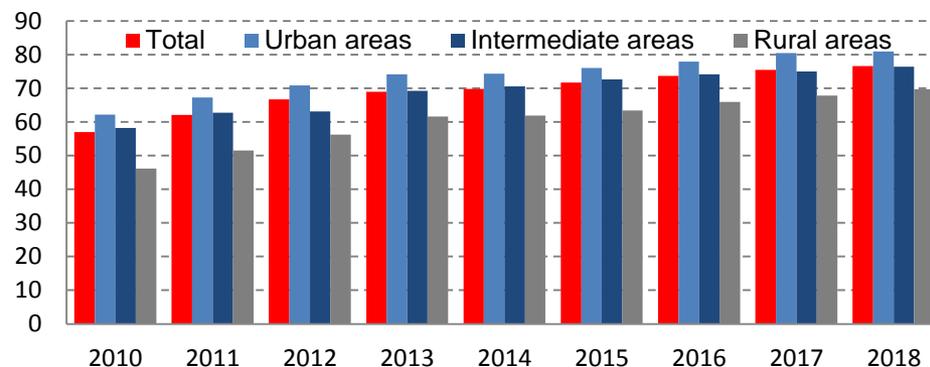
Source: Eurostat

Household fixed broadband penetration, rural vs total (% of households), 2018*
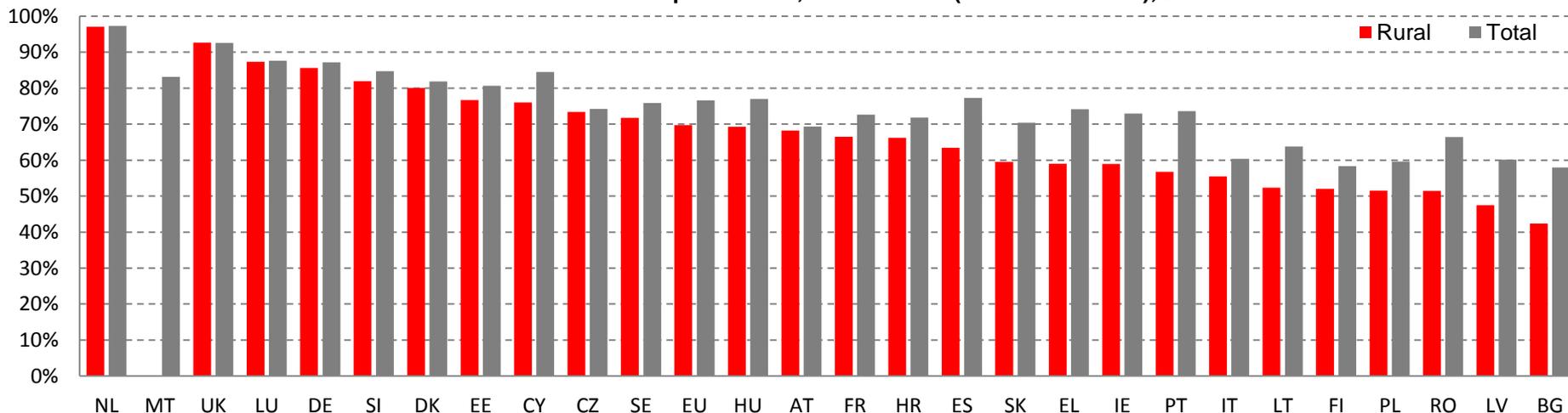

Source: Eurostat

*The figure for rural fixed broadband household penetration in Malta was removed due to low data reliability.
The figures for Belgium were removed due to low data reliability.

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The take-up of fast broadband access has doubled in the last 3 years. In July 2018, 41% of homes had a subscription of at least 30 Mbps. The Netherlands, Malta and Belgium are the leaders in fast broadband take-up in Europe.

There has been a sharp upward trend in the take-up of fast broadband in the EU since 2010, triggered also by the continuous deployment of infrastructure. Almost all cable subscriptions and around one third of DSL subscriptions have been migrated to high-speed plans. Fibre services are also catching up. In the Netherlands, Malta and Belgium more than two thirds of homes already subscribe to fast broadband, while in Greece, Cyprus and Croatia take-up remains below 20 %.

Households with a fast broadband (at least 30Mbps) subscription (% of households), 2012 - 2018
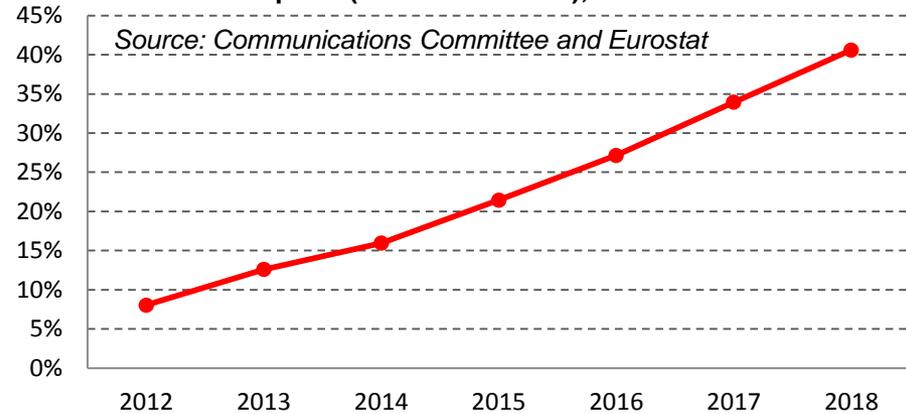
Source: Communications Committee and Eurostat

Households with a fast broadband (at least 30 Mbps) subscription (% of households), 2018

*Source: Communications Committee and Eurostat*

European Commission
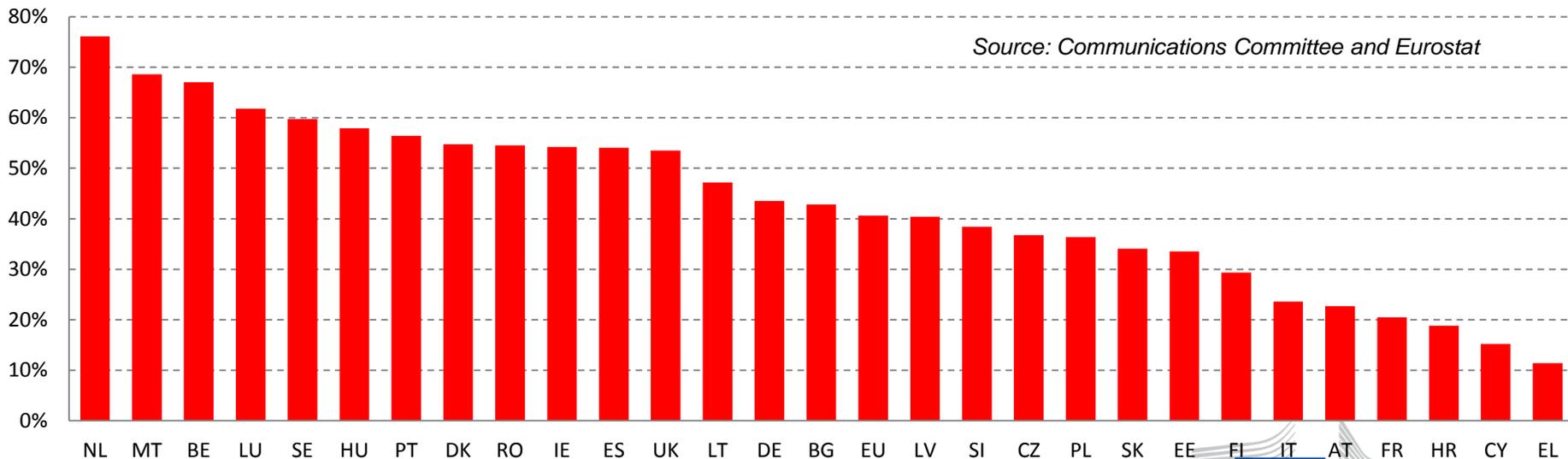
20 % of European homes currently subscribe to ultrafast broadband (at least 100 Mbps), a marked improvement from 2 % 6 years ago. Sweden, Portugal, Romania, Hungary and Belgium are the most advanced in ultrafast broadband adoption.

The Digital Agenda for Europe set the objective of at least 50 % of homes subscribing to ultrafast broadband by 2020. In June 2018, 60 % of homes were covered by networks capable of providing 100 Mbps. As service offers emerge, take-up is growing sharply. Penetration is highest in Sweden, Portugal, Romania and Hungary with over 40% of homes subscribing to at least 100 Mbps. In Greece, Cyprus and Croatia take-up is very low.

Households with an ultrafast broadband (at least 100Mbps) subscription (% of households), 2012 - 2018

Source: Communications Committee and Eurostat

Households with an ultrafast broadband (at least 100 Mbps) subscription (% of households), 2018

Source: Communications Committee and Eurostat

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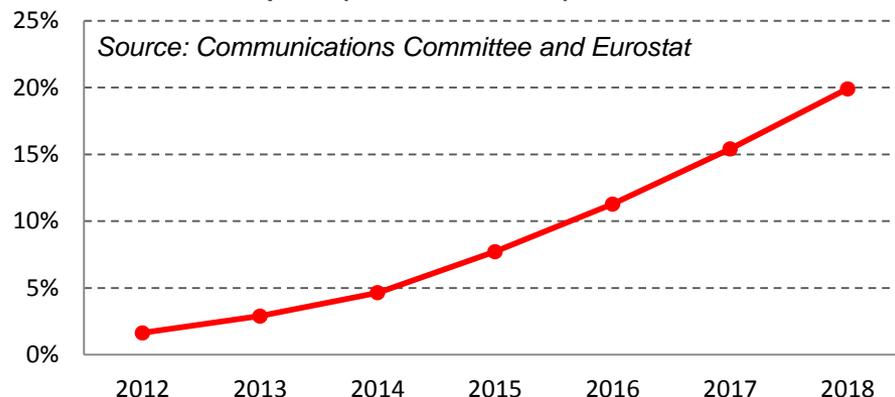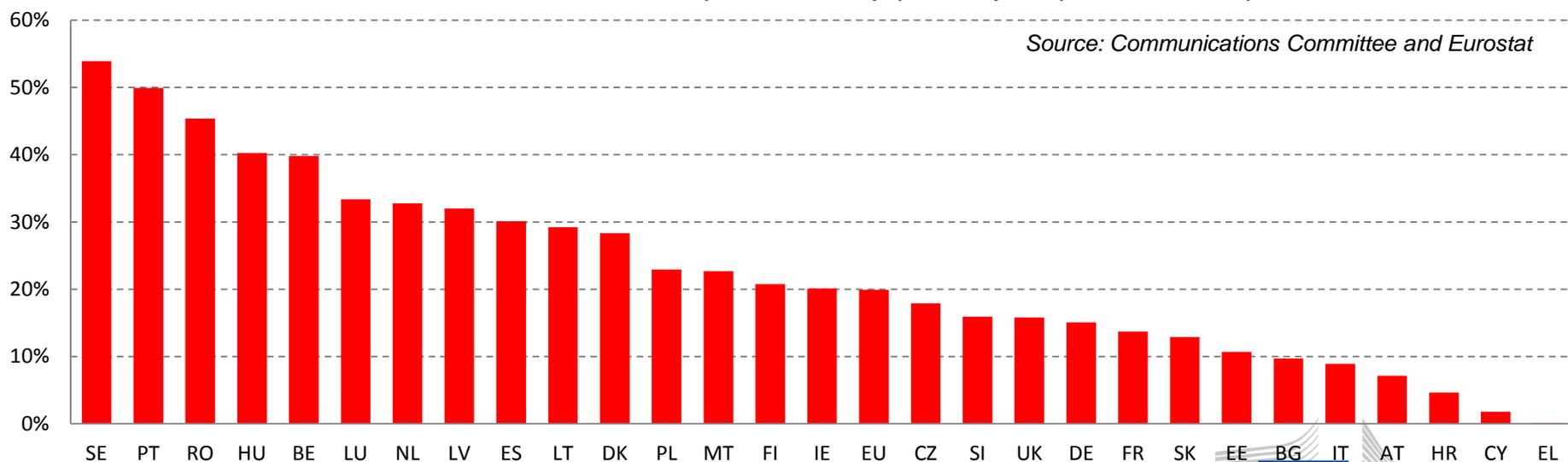
In the EU, 92 % of companies have a fixed broadband subscription. However, only 44 % have fast broadband (at least 30Mbps). While almost all large companies use broadband, 9 % of small enterprises are not yet connected.

While the vast majority of European businesses use broadband, only 44 % of companies and 41 % of private homes subscribed to fast broadband in 2018.

Nevertheless, there has been a significant improvement in fast broadband penetration, which increased by more than 20 percentage points (from 23 % to 44 %) for all enterprises in the last 4 years.

The take-up rate of fast broadband varies greatly between companies of different sizes. While 75 % of large companies benefit from broadband speeds of at least 30 Mbps, only 40 % of small enterprises do so.

Percentage of enterprises in the EU with fixed broadband connection, 2014-2018
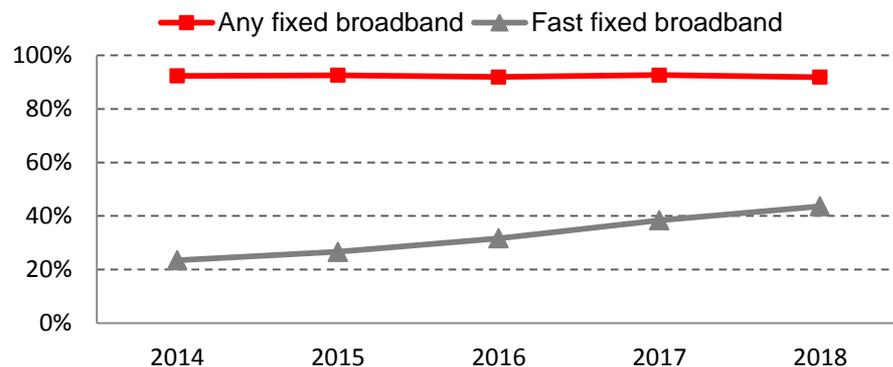
Source: Eurostat

Percentage of enterprises in the EU with any fixed broadband connection, by enterprise size, 2014-2018
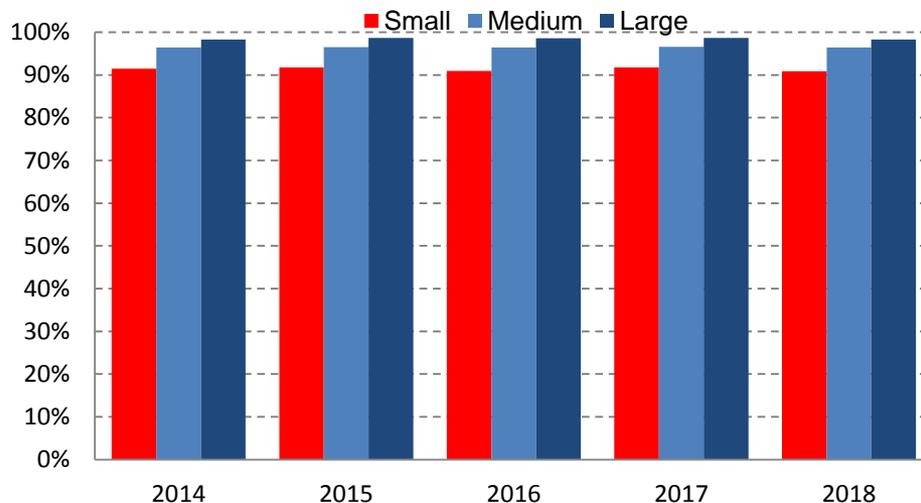
Source: Eurostat

Percentage of enterprises in the EU with a fast fixed broadband connection, by enterprise size, 2014-2018

Source: Eurostat

European Commission
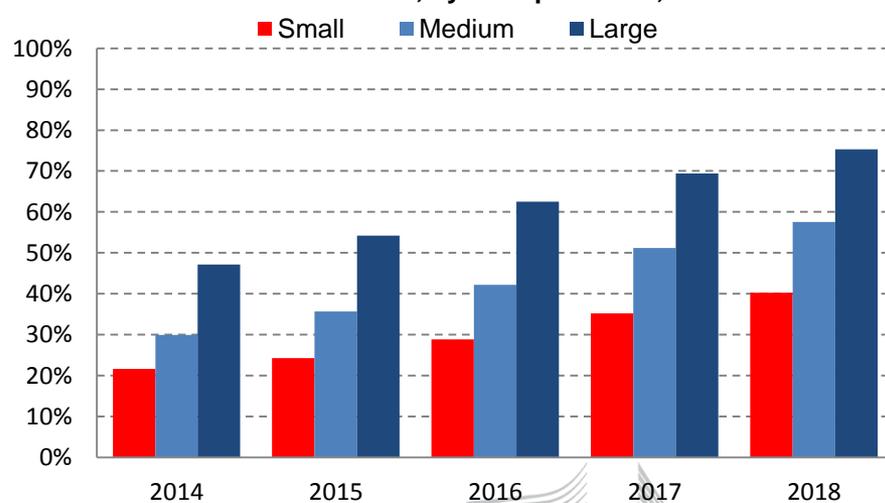
While 61 % of subscriptions are still xDSL, this technology is steadily losing market share. Cable is second with 19 % of the market. Fibre to the home/building (FTTH/B), as the fastest-growing technology, has already aqcuired a 16 % market share.

Although DSL is still the most widely used fixed broadband technology, its market share declined from 80 % in 2008 to 61 % in 2018 – almost 20 percentage points in 10 years. Its main challenger — cable — increased its share slightly (15 % versus 19 %) during the same period.

However, the most spectacular growth was achieved by FTTH/B, which has acquired 16 % of the market in just 7 years.

Nevertheless, DSL is still dominant, and its market share could be maintained for some years thanks to increasing VDSL coverage.

Fixed broadband net adds in the EU by technology, July 2006 – July 2018

Source: Communications Committee
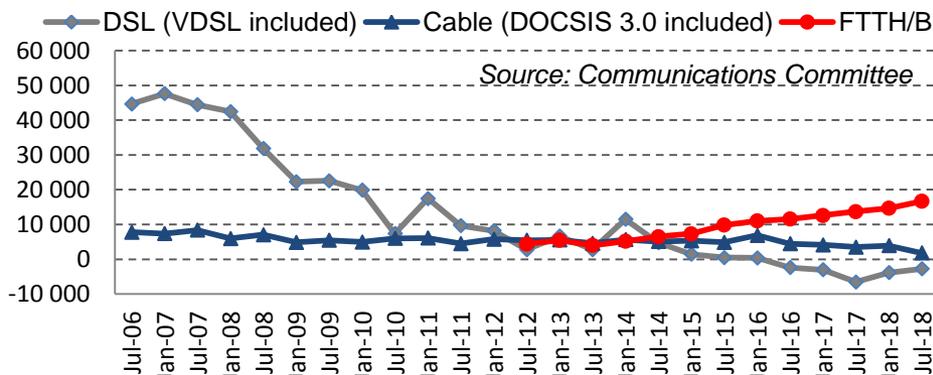
Fixed broadband subscriptions, technology market shares in the EU, July 2006 – July 2018

Source: Communications Committee

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European Commission
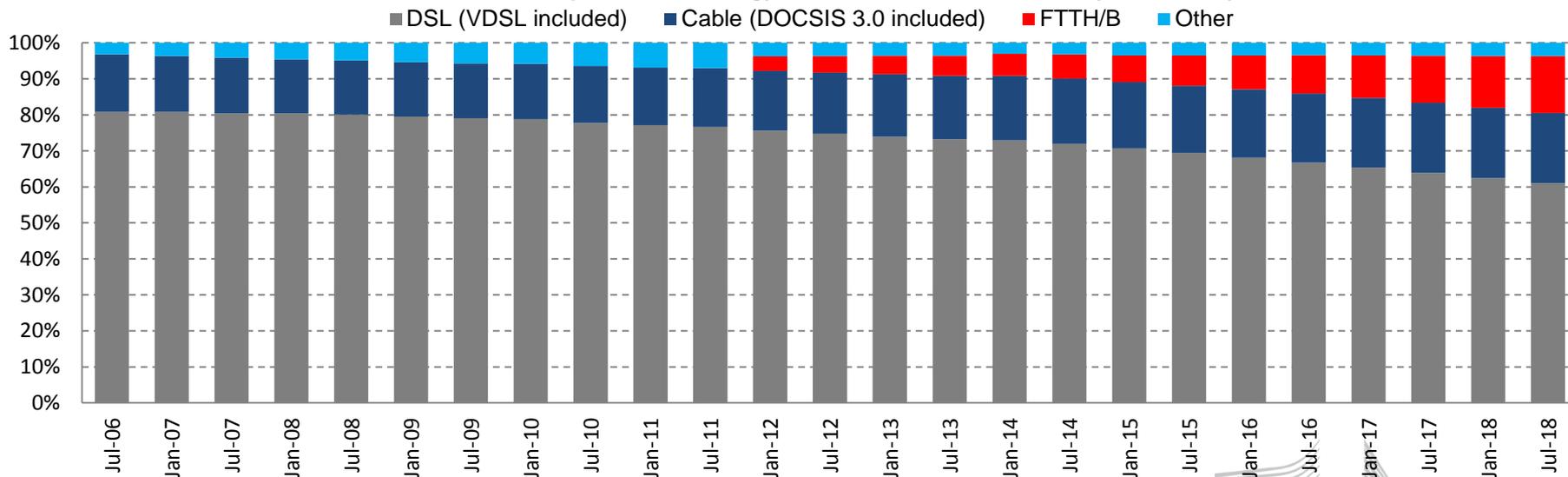
The market share of xDSL varies from 11 % to 100 % and is generally lower in eastern Europe, where FTTH/B is more widely used. Cable is present in all but two Member States.

xDSL is particularly important in Greece and Italy, and has the lowest market share in Bulgaria, Lithuania and Romania.

Looking at alternative technologies, cable is the main rival to DSL in the majority of Member States. Cable has a very high market share in Belgium, Hungary, Malta and the Netherlands.

FTTH and FTTB together represent 16 % of EU broadband subscriptions. FTTH/B is the most widely used technology in Lithuania, Latvia, Romania, Bulgaria, Portugal, Estonia and Sweden.

In these technologies, Europe continues to lag behind global leaders such as South Korea and Japan.
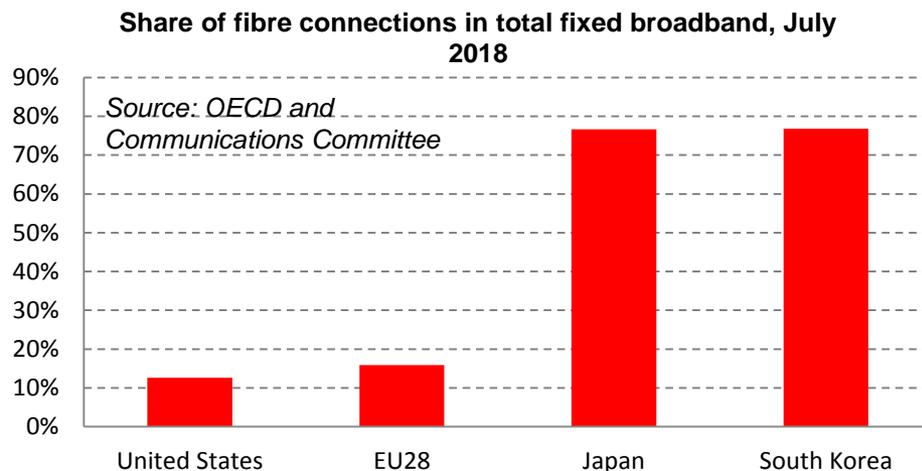
Share of fibre connections in total fixed broadband, July 2018

Source: OECD and Communications Committee

Fixed broadband subscriptions - technology market shares, July 2018

■ DSL lines % (VDSL included)   ■ Cable modem % (DOCSIS 3.0 included)   ■ FTTH/B %   ■ Other %

Source: Communications Committee

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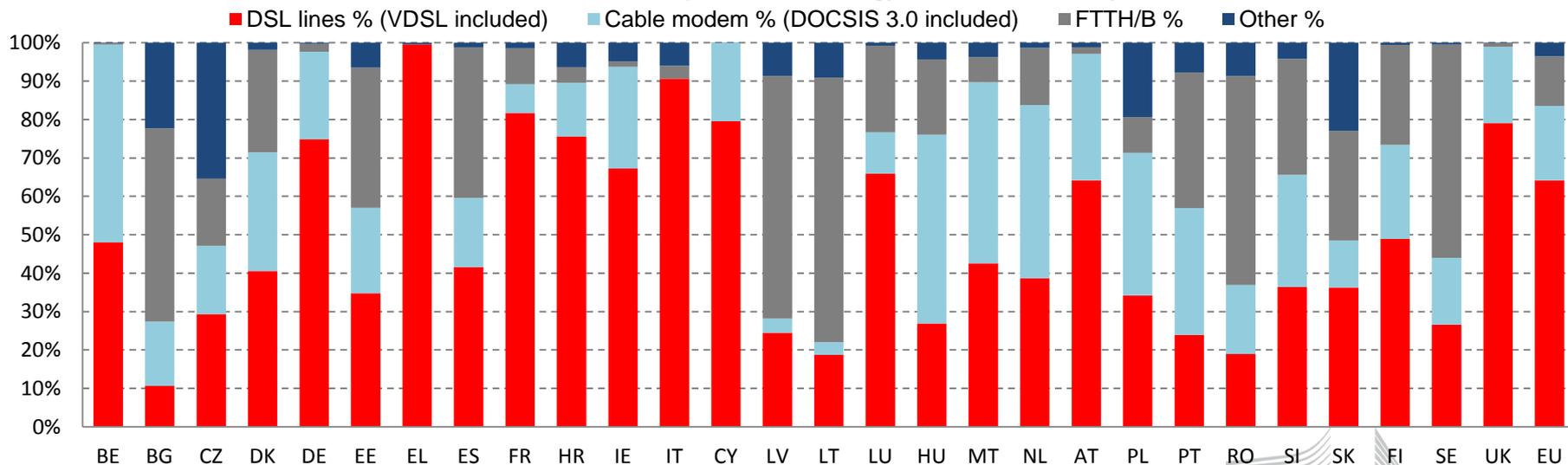
NGA subscriptions have increased sharply by 28.5 million in the last 2 years, and 55 % of all subscriptions are NGA. In 12 Member States, the market share of NGA is greater than 75%. By contrast, its take-up remains low in Greece, Cyprus, France, Austria and Italy.

NGA subscriptions have been steadily increasing in the EU since 2012 and currently account for 55 % of all EU fixed broadband subscriptions.

Belgium and the Netherlands lead ahead of other Member States in NGA take-up, with both VDSL and DOCSIS 3.0 cable widely available.

The highest growth in the last 12 months was in Malta (17 percentage points), Cyprus, Luxembourg and Italy (all 14 percentage points).

Total NGA subscriptions in the EU (in millions), July 2012 – July 2018

Source: Communications Committee
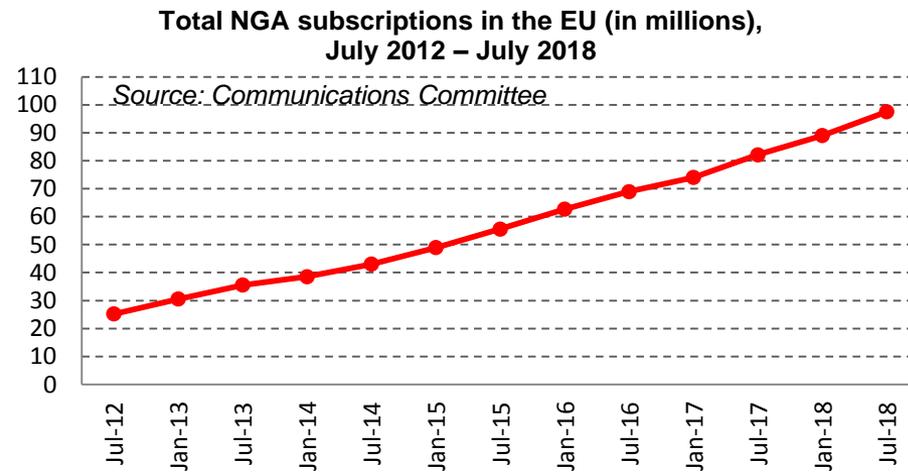
NGA (FTTH, FTTB, VDSL, DOCSIS 3.0 cable and other NGA) subscriptions as a % of total fixed broadband subscriptions, July 2018

Source: Communications Committee

European Commission
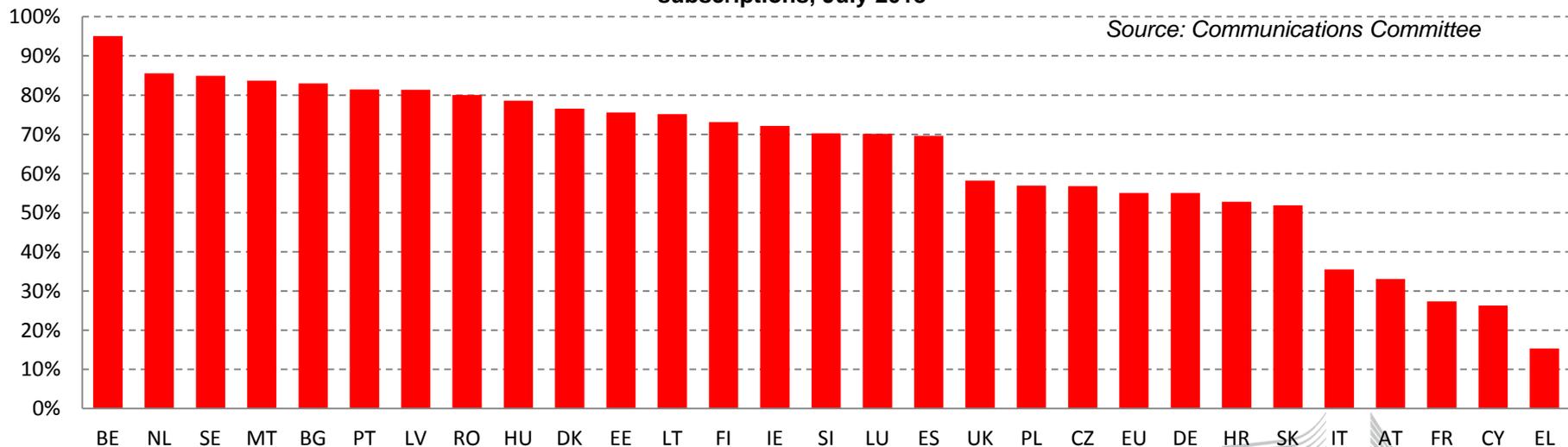
VDSL is currently the most widespread NGA technology in the EU in terms of take-up, followed by DOCSIS 3.0 cable. FTTH/B is catching up.

32 % of NGA subscriptions are DOCSIS 3.0, which is a relatively high figure given that cable broadband in total represents only 19 % of all EU fixed broadband subscriptions. While almost all cable networks have been upgraded to NGA, only 61 % of the xDSL network is VDSL-enabled. Nevertheless, VDSL coverage increased by 15 percentage points in the last 3 years and the number of subscriptions more than doubled. VDSL now represents 38 % of all NGA subscriptions, being the most widespread NGA technology. FTTH/B has a 29 % share in total NGA subscriptions.

Share of different NGA technologies in total NGA subscriptions, July 2018

Source: Communications Committee
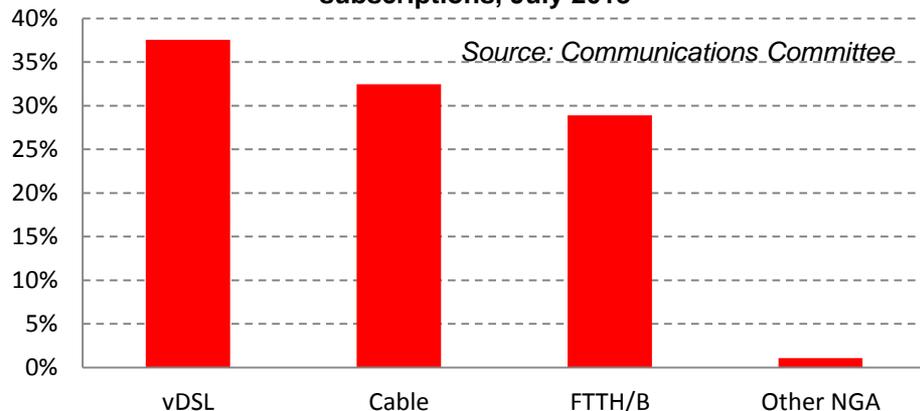
NGA subscriptions in the EU (millions) by technology, July 2012 – July 2018
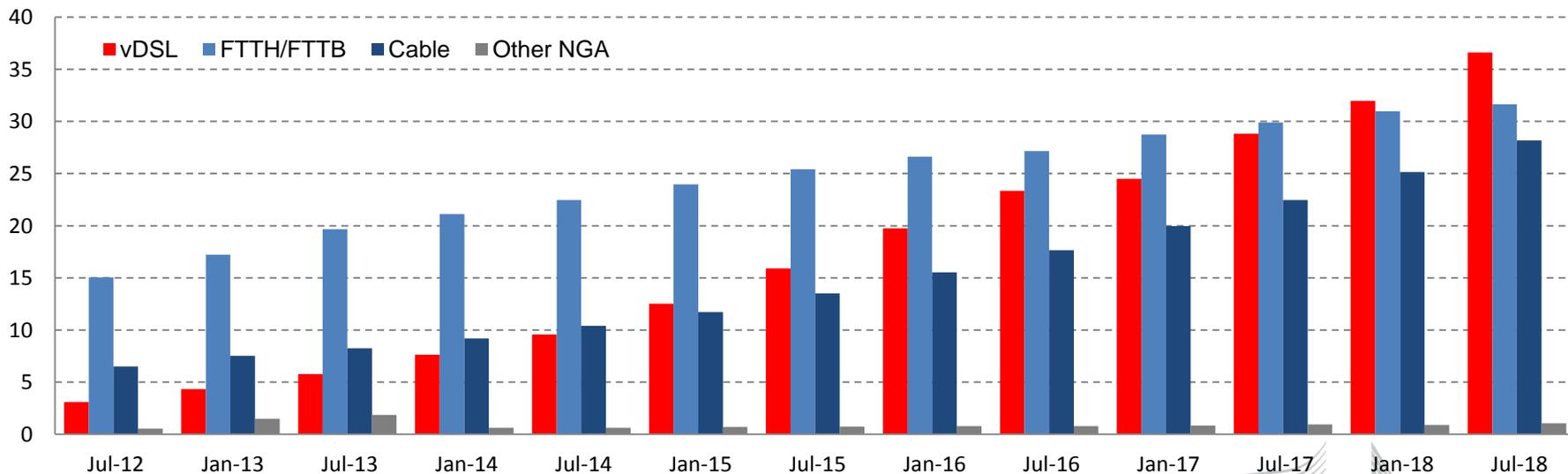
Competition in the fixed broadband market: while new entrant operators are gaining more and more market share, incumbents still control 40 % of subscriptions. The market share of incumbents is the highest in Luxembourg and Cyprus and the lowest in Czechia and Romania.

Market shares are calculated at national level for incumbents and new entrants. However, broadband markets are geographically fragmented suggesting that a large number of homes are served by only one provider (most likely the incumbent operator in this case).

Incumbent operators are market leaders in almost all Member States. Overall, the market share of incumbents in the EU has decreased by 10 percentage points since 2006. However, there have been no significant changes since 2015.

Fixed broadband subscriptions - operator market shares at EU level, January 2006 - July 2018

Source: Communications Committee
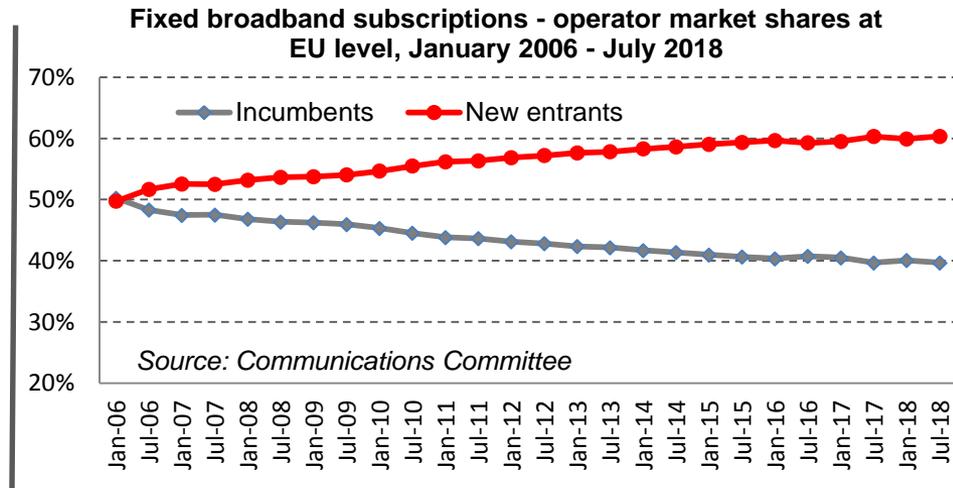
Fixed broadband subscriptions – operator market shares, July 2018

Source: Communications Committee

European Commission
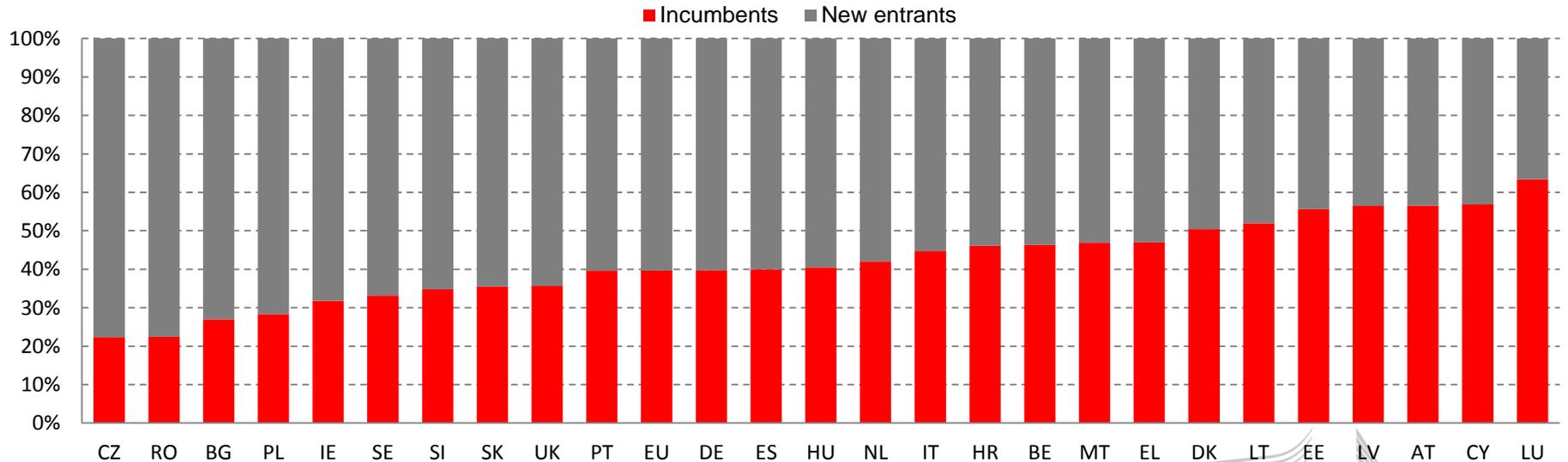
In the DSL market, unbundling has reduced the dominance of incumbents. However, in VDSL incumbents still hold 63 % of subscriptions. Nevertheless, NGA is provided primarily by new entrants mainly because of the high share of cable.

New entrant operators can compete with incumbents by using either the incumbent's network or their own network to offer internet access. In the EU, 48 % of new entrant subscriptions are based on incumbent networks. In Greece, competition is almost entirely based on regulated access to the incumbents access network, while in Italy and France over 80 % of subscriptions are DSL. In eastern European Member States, competition is based rather on competing infrastructures. This also goeas for Belgium, Malta, Portugal and the Netherlands.

Incumbent market share by technology, July 2018

Source: Communications Committee
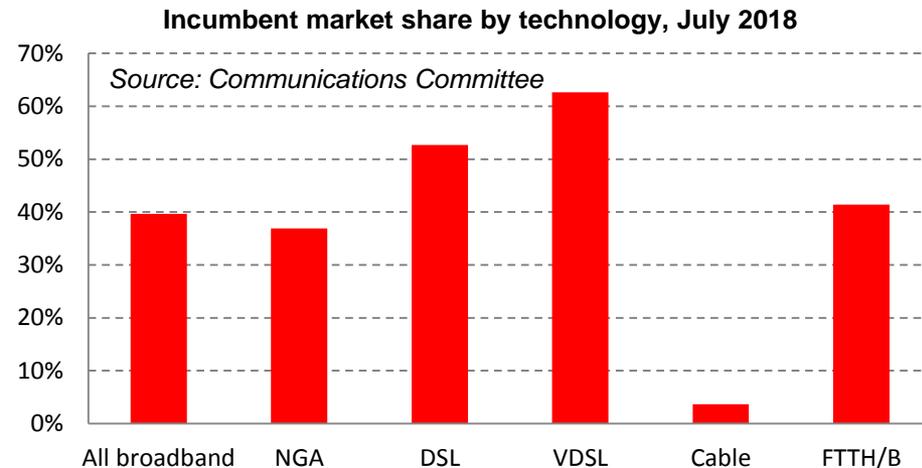
New entrant subscriptions – using own infrastrucutre or the incumbent network, July 2018

■ New entrant subscriptions using the incumbent's infrastructure   ■ New entrant subscriptions using own infrastructure

Source: Communications Committee

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European Commission

Mobile broadband represents a fast-growing segment of the broadband market. More than 70 % of all active mobile SIM cards use mobile broadband.

There are 96 active mobile broadband SIM cards per 100 people in the EU. The penetration rate doubled over the last 6 years.

In Poland, the Nordic countries, Estonia and Luxembourg there are already more than 120 subscriptions per 100 people, while in Hungary the take-up rate is less than half of that. Most mobile broadband subscriptions are used on smartphones rather than on tablets or notebooks.

Mobile broadband penetration at EU level (subscriptions per 100 people), July 2009 – July 2018

Source: Communications Committee
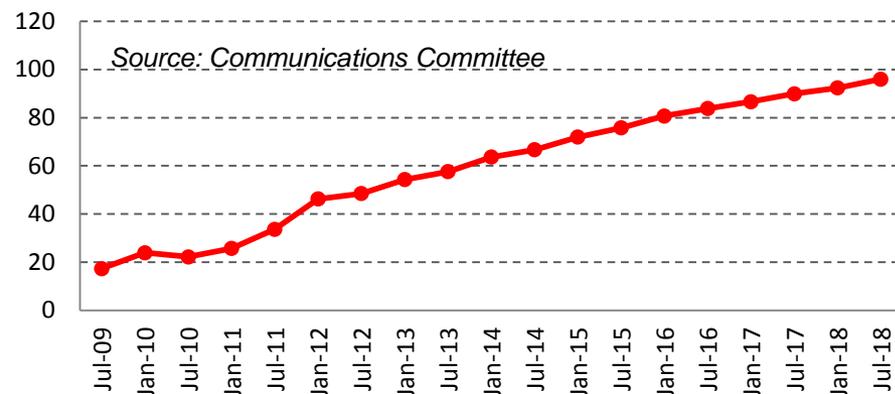
Mobile broadband penetration (subscriptions per 100 people), July 2018

Source: Communications Committee

European Commission
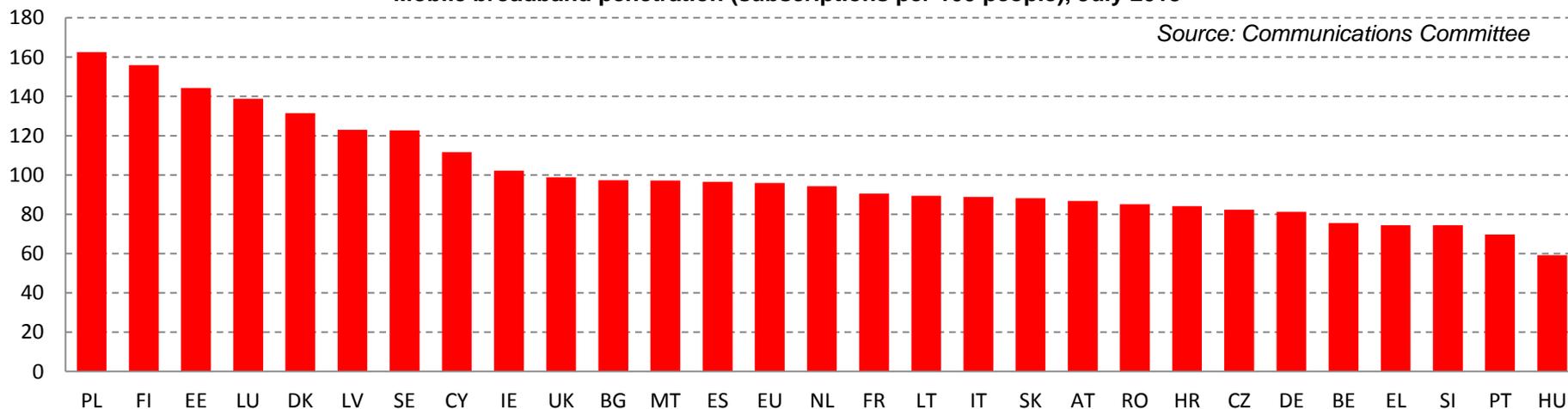
Mobile broadband is still mainly complementary to fixed broadband. In 2018, 9.5 % of EU homes accessed the internet only through mobile technologies. Finland and Italy were leaders in mobile–only access with 35 % and 22 % of homes respectively.

Europeans primarily use fixed technologies at home to access the internet. However, there is a growing number of homes with only mobile internet use. The percentage of homes with purely mobile broadband access grew from 4.1 % in 2010 to 9.5 % in 2018.

The Netherlands had the lowest mobile-only access rate at less than 0.2 % of homes, which correlates with the fact that it has the highest take-up rate of fixed broadband in the EU (97 %).

By contrast, in Finland, Italy, Poland, Latvia and Austria, where fixed broadband take-up is comparatively low, more than 15 % of homes rely purely on mobile technologies at home.

EU households using only mobile broadband connection at home (% of households), 2010-2018

Source: Eurostat
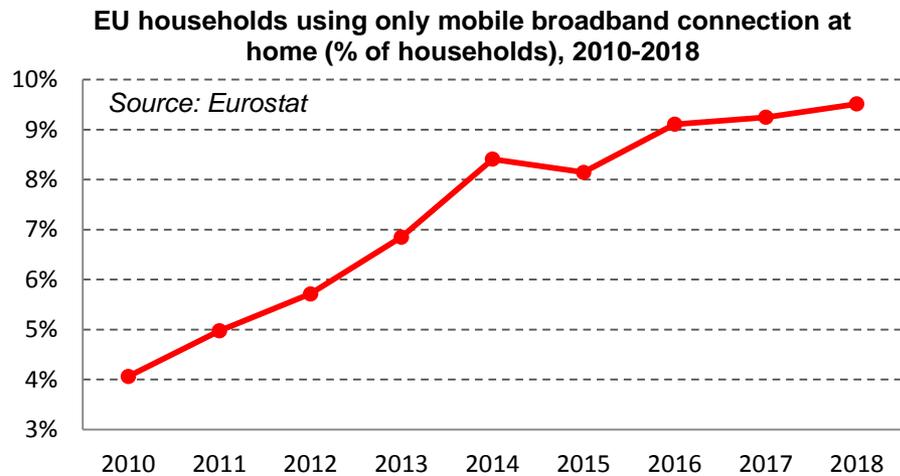
Households using only mobile broadband at home (% of households), 2018

Source: Eurostat

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European Commission
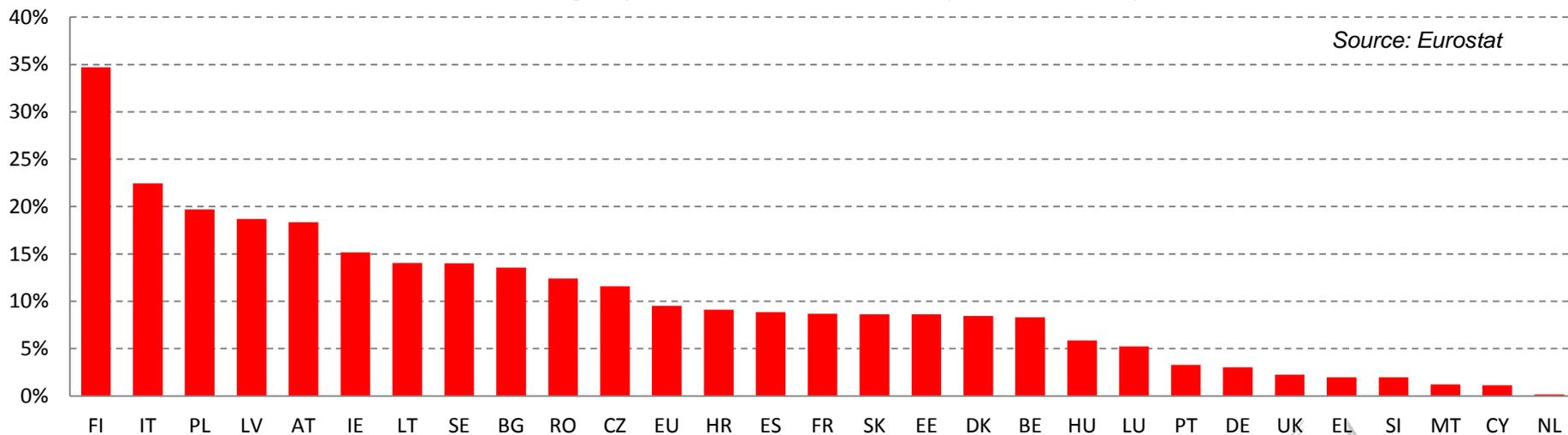
Internet traffic per capita in western Europe* is currently 44 GB per month. By 2022, this figure is forecast to go up to 117 GB, while in the USA it will be 255 GB, followed by South Korea with 218 GB. Internet traffic will continue to be **mainly fixed** in all world regions.

IP traffic per capita (GB per month and region), 2017 - 2022

Legend: ■ 2017 ■ 2022

Categories: EU (Western Europe), US, Japan, South Korea, Russia, China, World
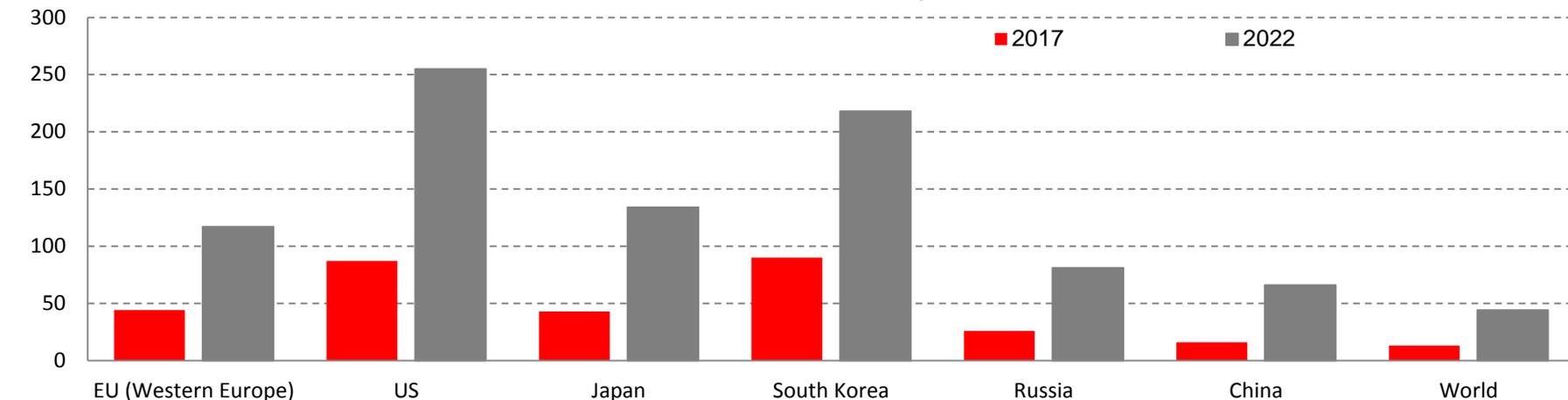
Source: Cisco, VNI Forecast Highlights

Internet traffic per capita in western Europe* is well below the figures for the US and South Korea.

Mobile data traffic is a fraction of total IP traffic, and this will remain so despite the increase forecasted by Cisco. Mobile data currently represents 6 % of European internet traffic, and this ratio is forecast to reach 10 % by 2022. Nevertheless, the share of mobile traffic will be significantly higher in Japan (14 %), China (18 %) and Russia (32 %). By contrast, only 6 % of US's traffic will go through mobile networks by 2022.

Percentage of mobile data share of total Internet traffic, 2017 - 2022

Legend: ■ 2017 ■ 2022

Categories: EU (Western Europe), US, Japan, South Korea, Russia, China
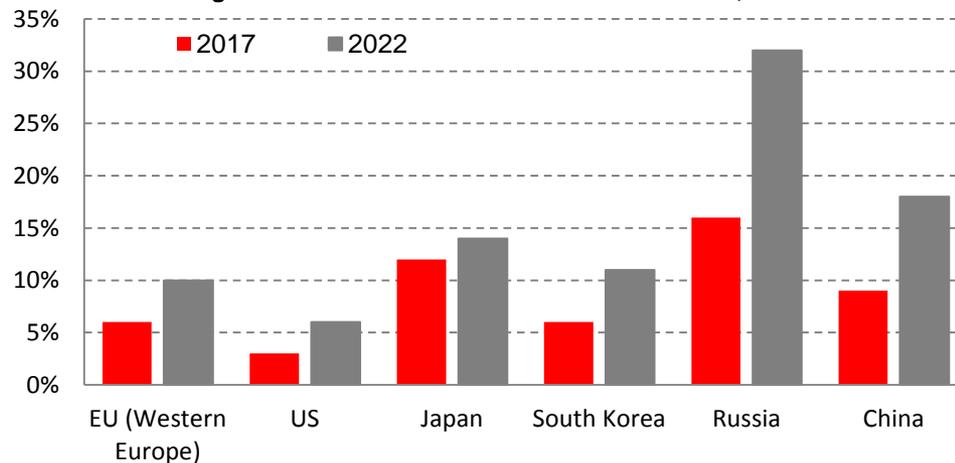
Source: Cisco, VNI Forecast Highlights

* France, Germany, Italy, Spain, Sweden, the United Kingdom, Denmark, Netherlands, Belgium, Ireland, Norway and Iceland.

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Mobile traffic per capita in western Europe* is currently 2.4 GB per month. By 2022, this figure is forecast to reach equally 12 GB in both western Europe and in China, while in the USA it will be 17 GB. The **average mobile speed** in western Europe is currently 16 Mbps, ahead of the USA, with 13.5 Mbps.

Average mobile speed (Mbps per region), 2017 - 2022
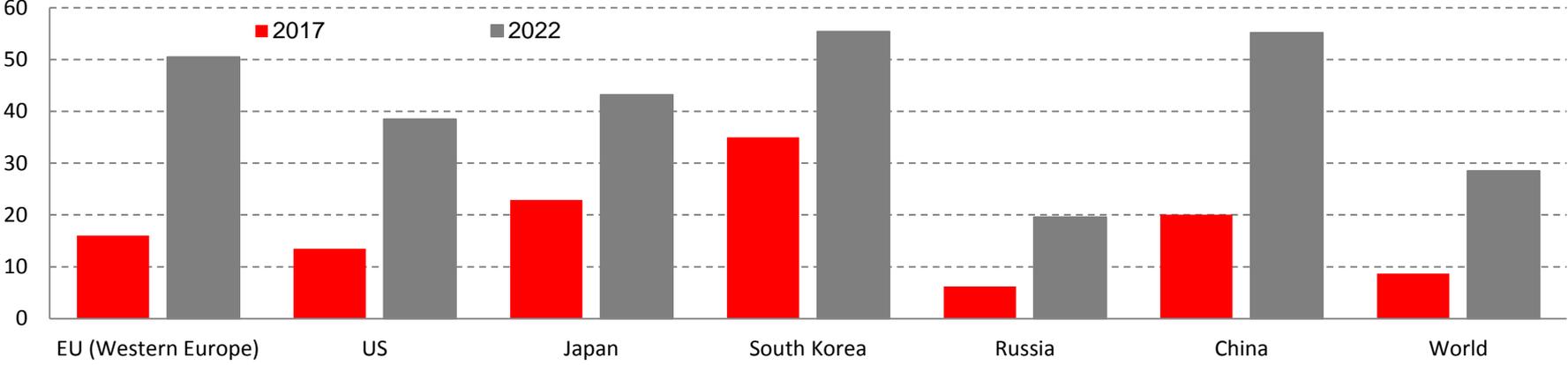
Source: Cisco, VNI Forecast Highlights

Average mobile traffic per capita in in western Europe is well below the figures for the USA, Japan, South Korea and Russia. Mobile traffic per capita is forecasted to skyrocket by 2022. It is currently 2.4 GB per capita in the EU and it is forecast to reached 12 GB per capita by 2022. Nevertheless, the traffic per capita is significantly higher in the USA (3.8 GB), Japan (5.3 GB), South Korea (5.8 GB) and Russia (4.2 GB). Only China, with 1.4 GB per capita, is currently below European levels. By 2022, Russia will have taken the lead with 25.5 GB of mobile traffic per capita, followed by South Korea with 23.5 GB.

* France, Germany, Italy, Spain, Sweden, the United Kingdom, Denmark, Netherlands, Belgium, Ireland, Norway and Iceland.

Average mobile traffic per capita, GB per month, 2017 - 2022

Source: Cisco, VNI Forecast Highlights

European Commission

67 % of EU households subscribe to bundled services. Double play and triple play bundles are available in all Member States, with an EU average of 31 % and 25 % respectively. Quadruple play is the least used with 11 %.

Bundled services are most widely used in Malta, France, Portugal, the Netherlands and Greece (>80 %), while the lowest take-up is in Czechia, Lithuania and Sweden (<30 %).

Double play bundles are most popular in Germany (57 %), Greece, Malta and Cyprus, but in almost half of the countries more than 30 % of the households subscribe to such services.

Regarding triple play bundles, Estonia, the Netherlands, France and Luxembourg lead ahead of other Member States. The penetration rate is higher than 30 % in 10 countries. There was less than 10 % take-up in Bulgaria, Latvia, Czechia, Lithuania, Sweden and Poland.

When it comes to quadruple play, the picture is more polarised. While the EU average is 11 %, there are 17 Member States, where take-up is less than 3 %. Penetration is above 18 % in eight countries (France, Portugal, Malta, Spain, Luxembourg, Slovenia, the Netherlands and Belgium).

The prevalence of bundled services is linked to the regulatory environment. More and more national regulatory authorities are considering bundles or multiple-services in their market analysis, especially in connection with the replicability of bundles. Some of them impose obligations to communicate retail offers before their commercial launch.

Double/triple/quadruple play (subscriptions/households), July 2017*

Source: Communications Committee

Legend: Quadruple play · Triple play · Double play

*Data for Finland is not available.

European Commission

20 % of EU households subscribe to converged bundles (including both fixed and mobile services). However their popularity varies widely among Member States, ranging from 0 % to 61 %.

While 65 % of homes subscribe to bundles including fixed broadband, only 20 % of households chose bundles with mobile services.

Spain, Luxembourg and France lead in the take-up of converged bundles (>50 %). However, converged bundles have a penetration rate of less than 20 % in 16 Member States.

Households subscribing to telecoms services as part of a bundle in the EU (% of households), July 2017

Source: Communications Committee
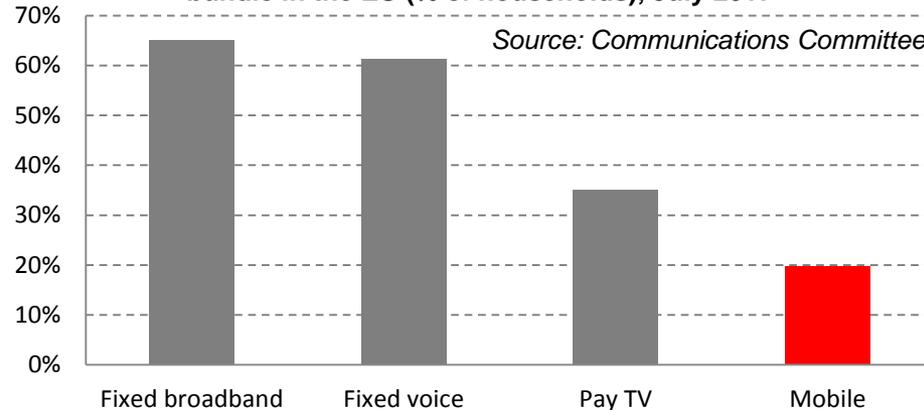
Households subscribing to converged bundles (% of households), July 2017*

Source: Communications Committee

*Data for Finland is not available.

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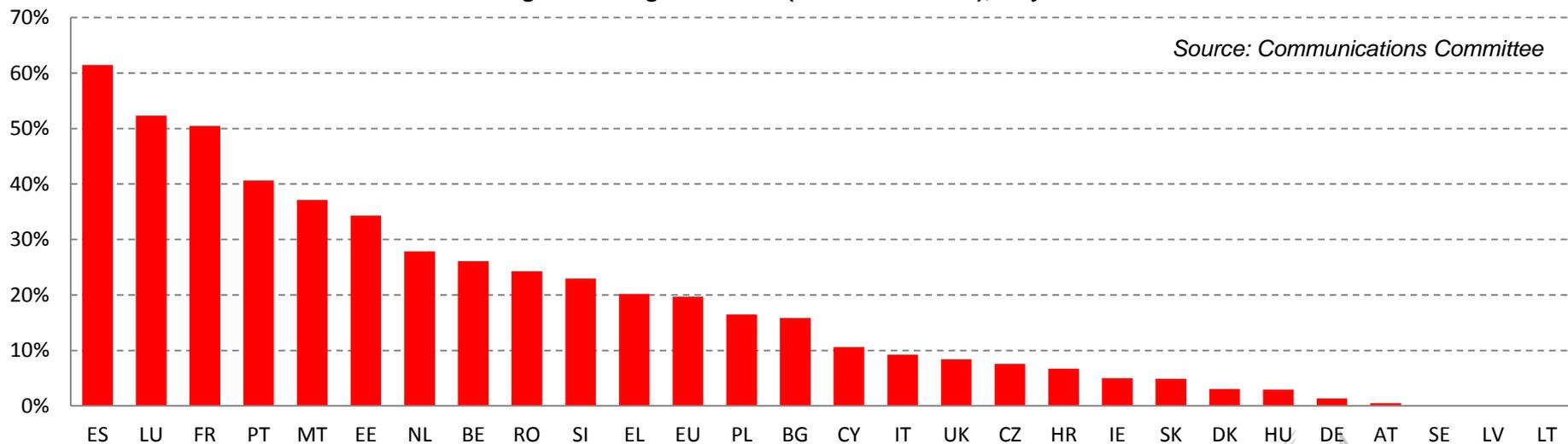
Broadband take-up tends to be lower in Member States where the cost of broadband access accounts for a higher share of income, but this correlation is not strong. Based on the Broadband Price Index, fixed broadband is most affordable in Finland, France, Germany and Austria.

Income plays an important role in broadband take-up. The lowest income quartile has a take-up rate for fixed broadband of just 60 % as opposed to 90 % in the highest income quartile. The take-up in the EU for average income is 76.6 %.

The **Broadband Price Index** is a score* 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).
* 0 to 100, 100 being the best

Fixed broadband household penetration by income quartiles, 2014-2018

Legend: Low income — Medium low income — Medium high income — High income — Average income
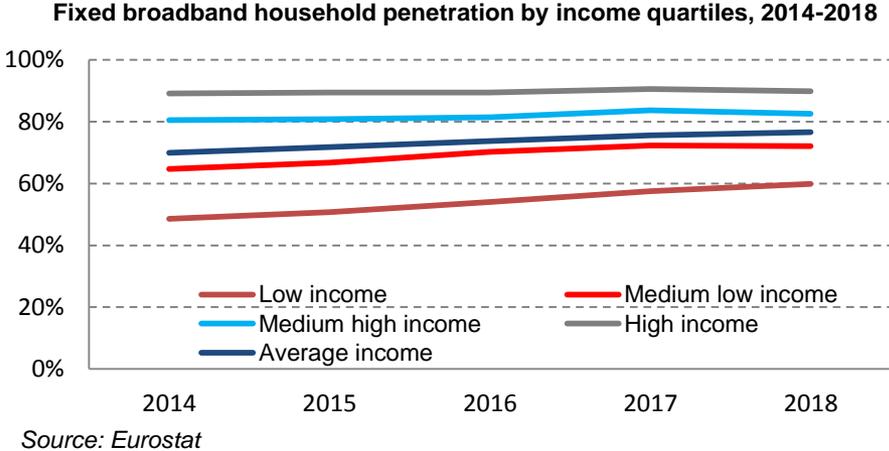
Source: Eurostat

Broadband Price Index (0-100), DESI 2019*

FI FR DE AT LT IT LU SK CZ LV EU HU NL DK PL SE RO UK EE BE BG PT ES IE SI HR CY EL
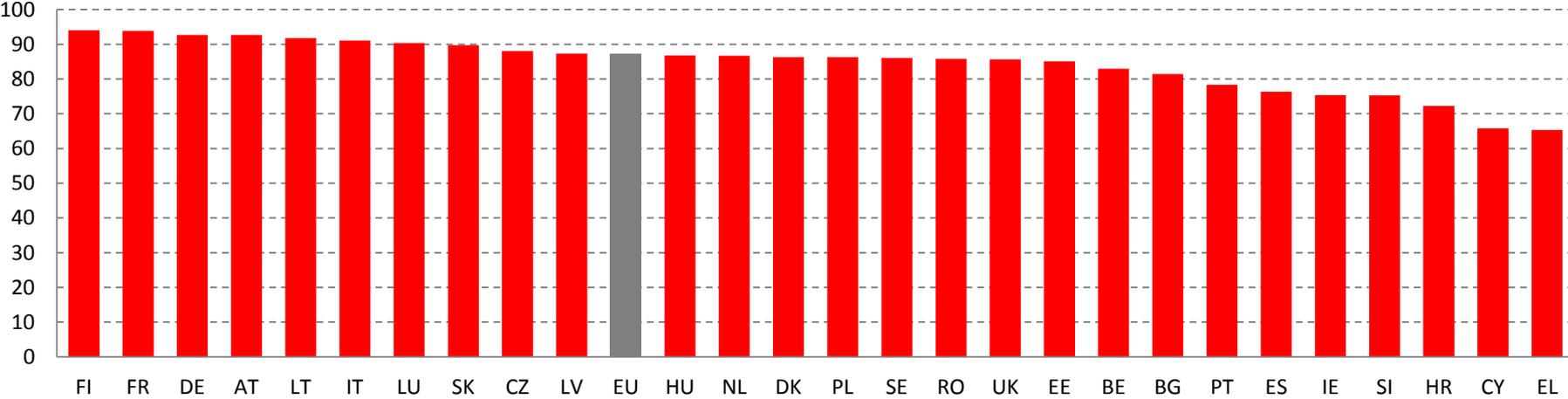
* No income data available for MT, therefore Broadband Price Index not calculated.
Source: European Commission based on Empirica and Eurostat

European Commission

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

Broadband retail prices (minimum prices, based on Purchasing Power Parity/PPP) vary between EUR 10 and EUR 38 for a standalone offers with a minimum download speed of 12 Mbps. The minimum prices were the lowest in Bulgaria (EUR 10), Hungary (EUR 11) and Romania (EUR 13), and the highest in Ireland (EUR 38), Spain (EUR 33), Slovenia (EUR 31) and Cyprus (EUR 30).

As for offers of at least 100 Mbps, the EU average is EUR 35 with a substantial decrease from 2014, where the average was EUR 60.

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

Broadband retail prices (EUR PPP) – standalone offers, 2014 - 2018
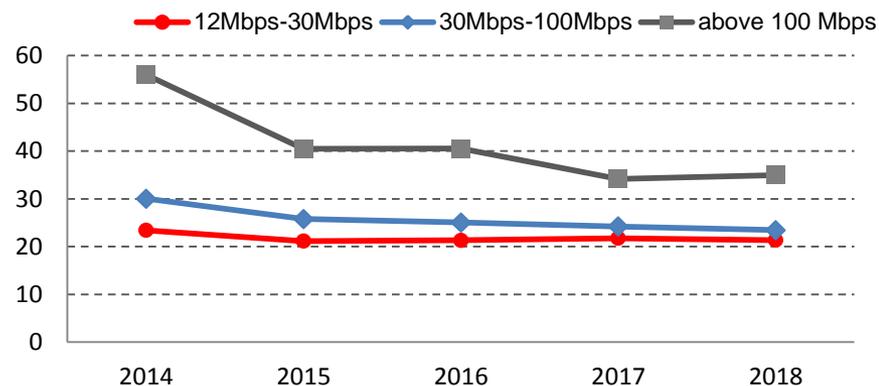
Source: European Commission Services based on Empirica and Van Dijk, Fixed Broadband Prices in Europe, annual report. 2014-2018.

Fixed broadband retail prices (EUR PPP) - standalone offers, October 2018
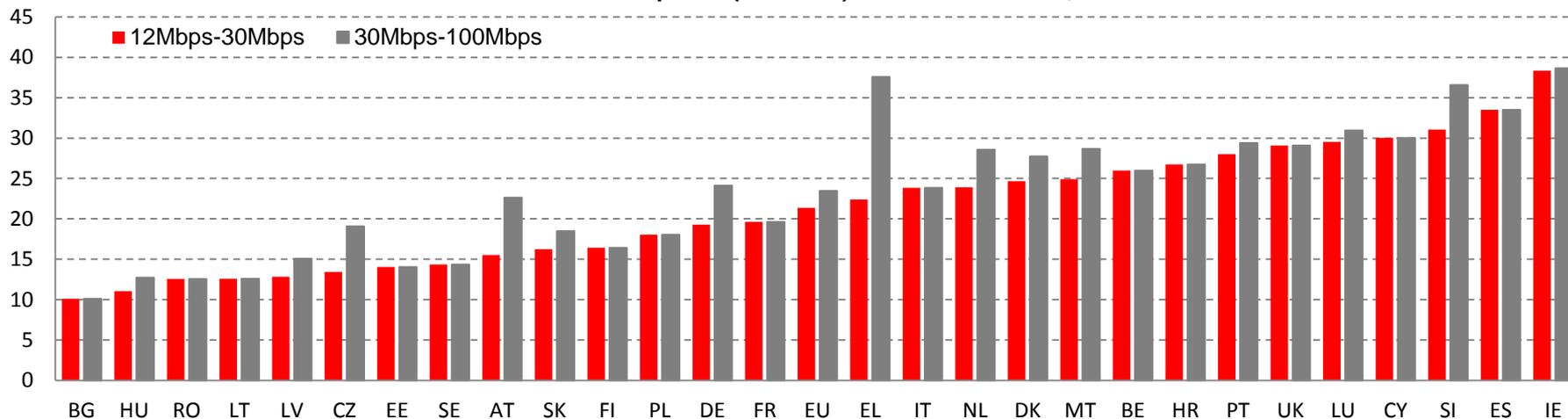
Source: European Commission services based on Empirica, Fixed Broadband Prices study, 2018

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European Commission

Prices* of triple play bundles** which include fast broadband access, fixed telephony and television have fallen by 21 %, on average, since 2014. The largest decrease has been in higher speeds, with a 30 % price decrease between 2014 and 2018.

The minimum prices for triple play bundles that include broadband access (with a download speed between 12 and 30 Mbps), fixed telephony and television vary between EUR 26 and EUR 65 in the EU. The lowest prices were recorded in Slovakia (EUR 26), Lithuania (EUR 26.5) and Latvia (EUR 27), while the highest were in Sweden (EUR 65), Belgium (EUR 63), Spain (EUR 57), Ireland (EUR 55), and Malta (EUR 54).

The EU average prices for at least 100 Mbps offers is EUR 53 with a decrease of 30 % from 2014.

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

Broadband retail prices (EUR PPP) – bundles including broadband, fixed telephony and television, 2014-2018
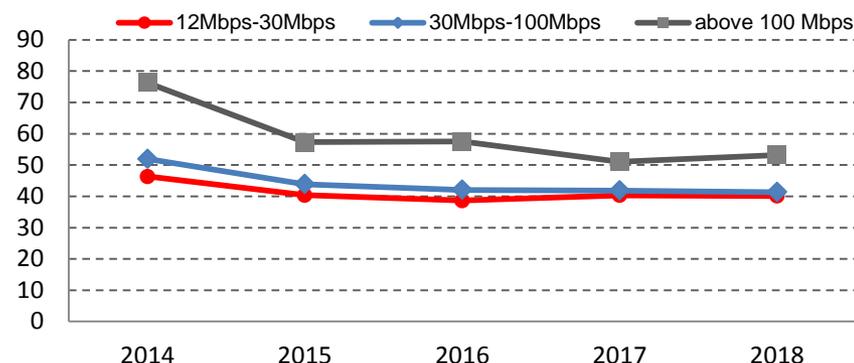
Source: European Commission Services based on Empirica and Van Dijk, Fixed Broadband Prices in Europe, annual report. 2014-2018.

Fixed broadband retail prices (EUR PPP) - bundles including broadband, fixed telephony and television, October 2018
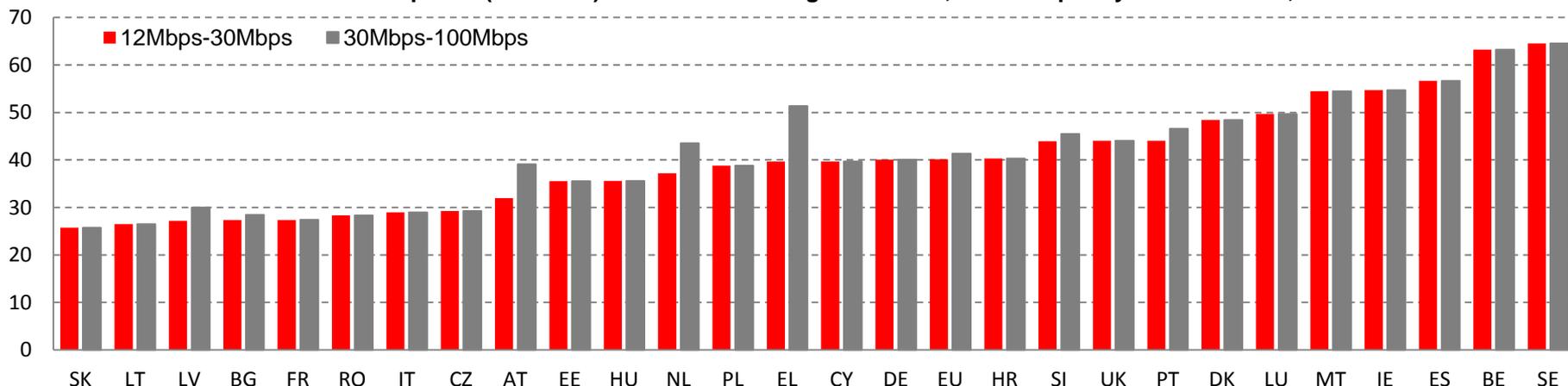
Source: European Commission services based on Empirica, Fixed Broadband Prices study, 2018

European Commission

Prices of mobile voice and data plans vary greatly across Europe. Prices have fallen in all but one consumption basket (500 MB + 100 calls). The largest price drop is in the most data-intensive basket (5 GB + 100 calls) which has fallen by 20 % since 2017.

Looking at the usage basket of 300 voice calls and 1GB data, minimum prices range between EUR 8 and EUR 59 with an EU average of EUR 22 (EUR 2 cheaper than a year ago).

The cheapest countries are Luxembourg, Italy, Slovenia, Austria and France, with minimum prices below EUR 10.

By contrast, prices are high in Bulgaria (EUR 59), Greece (EUR 56), Hungary (EUR 47), Slovakia (EUR 46) and Czechia Bulgaria (EUR 43).

Mobile broadband prices (EUR PPP) - handset use in the EU, 2017 - 2018
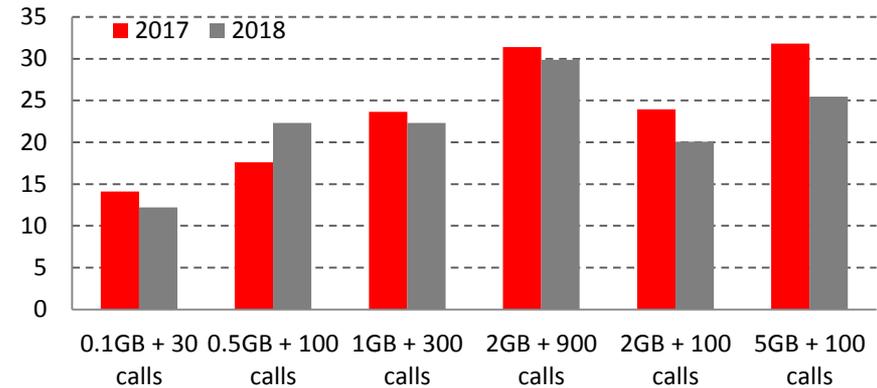
Source: Commission services based on Empirica, Mobile Broadband Prices study, 2017- 2018

Mobile broadband prices (EUR PPP) - handset use, 1GB + 300 calls, 2018
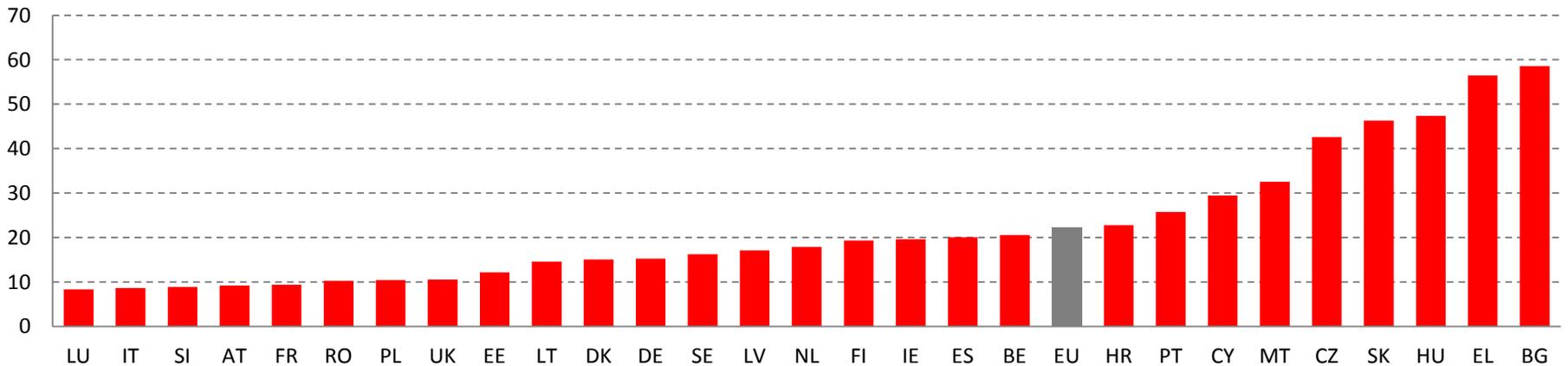
Source: Commission services based on Empirica, Mobile Broadband Prices study, 2018

European Commission

Prices of mobile broadband plans for laptops and tablets show large differences across Europe. On average, prices have decreased for all types of consumption baskets since 2016, ranging from 5 % to 16 %.

Looking at 5 GB data-only plans for laptops, minimum prices range from EUR 3.7 to 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).

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

Mobile broadband prices (EUR PPP) - laptop/tablet use in the EU, 2017 - 2018
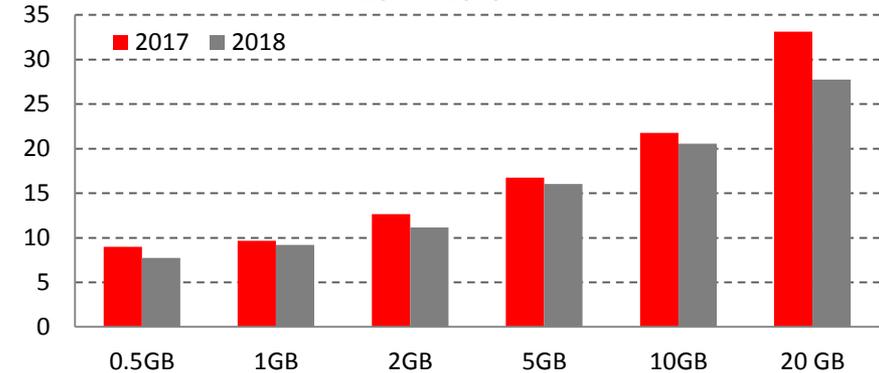
Source: European Commission services based on Empirica, Mobile Broadband Prices study, 2017-2018

Mobile broadband prices (EUR PPP) - laptop/tablet use, 5GB, 2018

Source: European Commission services based on Empirica, Mobile Broadband Prices study, 2018

European Commission

Mobile prices worldwide: compared with the USA, Japan and South Korea, the EU is cheaper for data-intensive handset usage baskets. Compared with the USA, the EU is cheaper for all data-only (laptop/tablets) packages.

On average, the EU performs well in all data consumption baskets, with much lower prices than South Korea and Japan, even in high-consumption baskets (5 GB). When comparing EU and US prices, prices are lower for all baskets in the EU, except for the basket with 1 GB data and high intensity of voice calls (2GB + 900 calls).

Regarding the handset use baskets with less than 2 GB data usage, the USA offered flat rates for calls and text messages for EUR 26.7 in 2018, while in South Korea 5 GB is included in all data consumption baskets.

Mobile broadband prices (EUR PPP) - handset use in the EU and the US, Japan and Korea, 2018
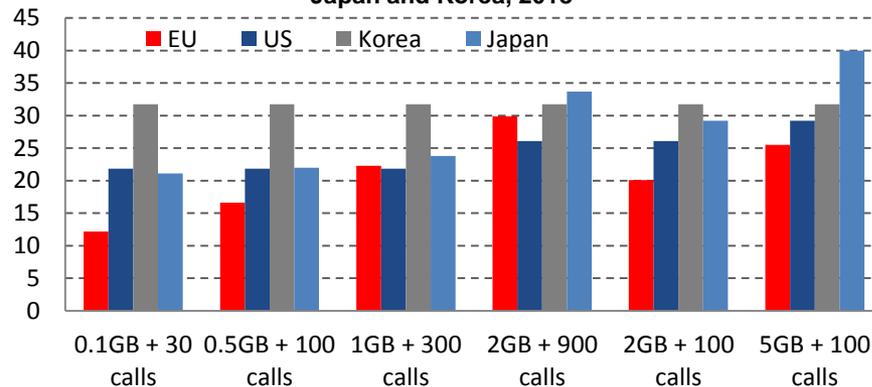
Source: European Commission services based on Empirica, Mobile Broadband Prices study, 2018

Mobile broadband prices (EUR PPP) - laptop/tablet use in the EU, the US, Korea and Japan, 2018

Source: European Commission services based on Empirica, Mobile Broadband Prices study, 2018
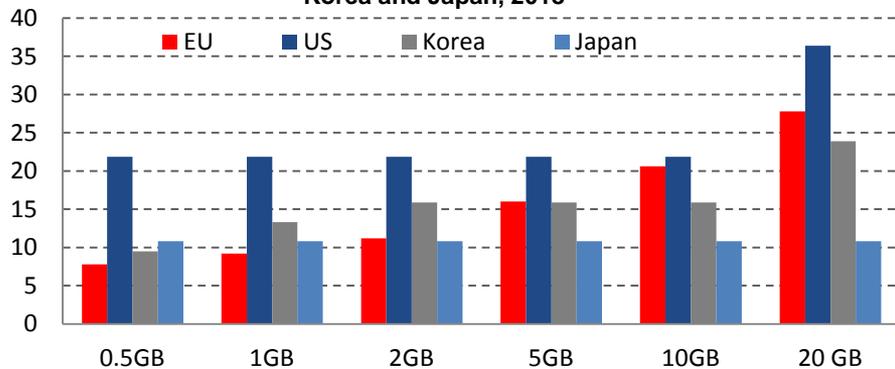
Regarding laptop/tablet baskets, the USA is more expensive than the EU for all baskets. The least expensive data-only offer in the USA allows up to 10 GB of data for EUR 22.

In the case of Japan, prices have substantially dropped from previous years, and baskets of up to 20 GB can be found for EUR 10.8 on average. This is what makes Japan the best performer in this category.

On average, the EU performs well in lower baskets, but prices are higher than South Korea and Japan for high-end baskets (especially 10 GB and 20 GB).

Telecoms markets: general trends

Member States have actively been pursuing the connectivity objectives of the gigabit society.

While a few of them will not achieve the 30 Mbps ubiquitous coverage target by 2020, the focus has now shifted to achieving the 2025 target for all EU households to have access to at least 100 Mbps connectivity (upgradable to Gbps). https://ec.europa.eu/digital-single-market/en/policies/improving-connectivity-and-access

Ultra-fast broadband coverage is constantly improving. While this is driven by new fibre roll-outs in many Member States, in others it can be attributed to the wide availability of updated legacy networks (e.g. Germany, Belgium). Take-up of ultra-fast networks is steadily increasing and seems to broadly correlate with the affordability of prices. Only a few Member States have not yet updated their national broadband plans to reflect the gigabit objectives.

Almost all Member States have launched their 5G strategies focusing on the availability of spectrum, 5G testing and designating 5G cities.

A number of regional agreements for 5G corridors have been signed for automated driving.

A few Member States have earmarked investments to help develop 5G. Many operators have started or announced 5G trials and are exploring partnerships and network sharing agreements.

The pioneer band is 3.4 – 3.8 GHz, followed by the 700 MHz band. The first auctions have already taken place, and the voluntary peer review under the Radio Spectrum Policy Group also seems to have generated interest among administrations. Most auctions in the 3.4 – 3.8 GHz band were designed to enable large blocks to be acquired, facilitating the provision of 5G services. They also yielded a reasonable price (around €0.05/pop./MHz).

In the 700 MHz band, the plans of some Member States to reserve spectrum for public protection and disaster relief raise concerns about avoidable spectrum scarcity.

In terms of market developments, content drives competition and the increasing take-up of quad-play bundled offers drives a consolidation trend between fixed and mobile operators in markets where the two businesses were distinct up to now.

European Commission

Development of national broadband plans (NBPs)

Since the adoption of the Digital Agenda for Europe 2020 targets — i.e. coverage of 30 Mbps download for all Europeans and take-up of 100 Mbps subscriptions by at least 50 % of EU households **— all Member States have gradually adopted NBPs and started to implement them**, **albeit with various time lines ranging from 2017 to 2022.** Some NBPs are integrated into broader strategic approaches, while others are documents specifically dedicated to broadband deployment.

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

Declared broadband targets in NBPs are, first and foremost, guideposts, whose practical feasibility and actual success will depend on the utilisation of appropriate means, including legal measures and financial resources.

It is therefore important that Member States have the necessary resources and tools in place, rather than merely policy targets, to facilitate the effective rollout of broadband infrastructure on their territories.

Some Member States (e.g. Sweden, Finland, and the Netherlands) **have already adapted their NBP targets 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' (see Table next slide).

To facilitate the exchange of best practice between Member States on **developing their 5G Road Maps and adapting their NBP's to the gigabit targets for 2025**, the Commission set up the **COCOM Working Group 5G** in 2017. It finished its work in October 2018 and published a final report (see https://ec.europa.eu/digital-single-market/en/news/5g-observatory-reports-important-progress-5g-roadmaps). **This working group also identified common elements, which can become part of the revised NBPs.**

Broadband Targets of NBPs

MS	NBP-Targets	MS	NBP-Targets
Austria	99% coverage with 100 Mbps by 2020	Italy	100 % coverage with 30 Mbps by 2020 85 % coverage with 100 Mbps by 2020
Belgium	50% household (HH) penetration with 1 Gbps by 2020	Latvia	100% coverage with 30 Mbps by 2020 50% HH penetration with 100 Mbps by 2020
Bulgaria	100% coverage with 30 Mbps by 2020 50% of households and 80% of businesses subscribing >100 Mbps by 2020	Lithuania	100% coverage with 30 Mbps by 2020 50% HH penetration with 100 Mbps by 2020
Croatia	100% coverage with 30 Mbps by 2020. 50% HH penetration with 100 Mbps by 2020	Luxembourg	100% coverage with 1 Gbps downstream and 500 Mbps upstream by 2020
Cyprus	100% coverage with 30 Mbps by 2020. 50% HH penetration with 100 Mbps by 2020	Malta	100% coverage with 30 Mbps by 2020 50% HH penetration with 100 Mbps by 2020
Czechia	100% coverage with 30 Mbps by 2020 50% HH penetration with 100 Mbps by 2020	Netherlands	100% coverage with 100 Mbps by 2023 (updated 2018) Vast majority should take advantage of 1 Gbps by 2023
Denmark	100% coverage with 100 Mbps download and 30 Mbps upload by 2020	Poland	100% coverage with 30 Mbps by 2020 50% HH penetration with 100 Mbps by 2020
Estonia	100% coverage with 30 Mbps by 2020 60% HH penetration with 100 Mbps by 2020	Portugal	100% coverage with 30 Mbps by 2020 50% HH penetration with 100 Mbps by 2020
Finland	100% coverage with at least 100 Mbps by 2025 (updated 2018)	Romania	100% coverage with 30 Mbps and 80% coverage with over 30 Mbps by 2020 (updated 2018 to 2020 targets) 45% HH penetration with 100 Mbps by 2020
France	100% coverage with 30 Mbps by 2022	Slovakia	100% coverage with 30 Mbps by 2020
Greece	100% coverage with 30 Mbps by 2020 50% HH penetration with 100 Mbps by 2020	Slovenia	96% coverage with 100 Mbps, 4% coverage with 30 Mbps by 2020
Germany	100% coverage with 50 Mbps by 2018	Spain	100 % coverage with 30 Mbps by 2020 50 % HH penetration with 100 Mbps by 2020
Hungary	100% coverage with 30 Mbps by 2018 50% HH penetration with 100 Mbps by 2020	Sweden	95% coverage with 100 Mbps by 2020. 98% coverage with 1 Gbps, by 2025. 50% HH penetration with 100 Mbps by 2020 (updated 2018)
Ireland	100% coverage with 30 Mbps by 2020 50% HH penetration with 100 Mbps by 2020, expected upstream bandwidth of 17-21 Mbps	United Kingdom	Full fibre rollout to 15 million premises by 2025 (updated 2017) and 100% fibre coverage by 2033

Source: atene KOM: Study on National Broadband Plans in the EU (SMART 2014/0077), Commission services

European Commission

EU support for NBP implementation

The **European Investment and Structural Funds (ESIF)** support the NBP implementation by providing **almost € 6bn in grants in 2014-20**. **56% of** **the planned projects have already been signed.** The Commission proposed that this support continues in 2021-2027 with the focus on very high capacity networks (VHCNs).

The **European Fund for Strategic Investment (EFSI)** guarantees and the European Investment Bank (EIB) lending activity also support telecoms infrastructure projects: **as of February 2019, more than € 11,7bn had been mobilised, with € 3,1bn from EFSI and the EIB**. The Commission proposes to continue this support beyond 2021 with the InvestEU programme.

The **Connecting Europe Broadband Fund** was launched in 2018 and is expected **to unlock additional investments of between € 1bn and € 1.7bn**. A initial project for an open access network to cover 135.000 households in some rural areas of Croatia has already been signed.

The Commission has also tabled a **proposal for a Connecting Europe Facility 2021-2027 with € 3bn in grants** to different digital infrastructure investments (e.g. 5G corridors, VHCN for socio-economic drivers, backbone networks and local wireless network access connectivity to municipalities that builds on the WiFi4EU initiative).

The Commission continues to support the development of administrative capacity to design and implement NBPs through the **Broadband Competence Offices Network** launched in 2017 (with currently 115 members). It **brings together national and regional authorities** active in this field with the support of a permanent secretariat (Brussels based Support Facility). **An updated version of the Broadband investment Guide of the Commission will be published in 2019.**

Work to improve the **mapping of broadband** has also continued with the review of existing national initiatives. **An EU Broadband Mapping Portal was launched in spring 2019.** The Commission has commissioned a study to develop an EU broadband coverage methodology and will contribute to the work of the Body of European Regulators for Electronic Communications (BEREC) to provide guidelines on the geographical surveys and forecasts of network deployments set out in the European Electronic Communications Code (Directive (EU) 2018/1972).

The Commission has also shared with the Member States a "rural proofing questionnaire", aiming to ensure that the connectivity needs of rural areas are given the necessary attention in case of modification requests concerning broadband programmes financed under ESIF.

A first decision on authorising S**tate aid to deploy gigabit networks in areas, where an NGA network is already present,** was approved in December 2018 (SA. 48 418, Bavarian gigabit pilot project), as well as a decision on **take-up support through a voucher scheme** (SA.49 935, Superfast Broadband Project – Greece).

Municipalities need more connectivity – WiFi4EU

The WiFi4EU initiative promotes free Wi-Fi access in public spaces including parks, squares, public buildings, libraries, health centres and museums in municipalities throughout Europe.

The first and second call for proposals were launched respectively between the 7 and 9 November 2018, and between the 4 and 5 April 2019. Municipalities participated on a large scale, showing a genuine need for more connectivity. 21. 500 municipalities registered; over a fifth of all European municipalities. 13,200 municipalities applied for a WiFi4EU voucher in the first call, and a bit more than 10,000 again in the second call.

Each voucher entitles the winning municipality to install a WiFi4EU network, which covers costs of up to € 15,000.

In December 2018, the Commission awarded 2,800 vouchers for a total of €42 million. The second call is ongoing with 3,400 vouchers equivalent to an additional € 51 million.

The vouchers were allocated on a first come, first served basis. To ensure geographical balance, a minimum of 15 and a maximum of 224 vouchers (for the first call) have been allocated to each country.

Other calls are planned in 2019 and 2020 for a total budget of the initiative amounting to EUR 120 million.

Total vouchers per country (1st call)

Source: European Commission
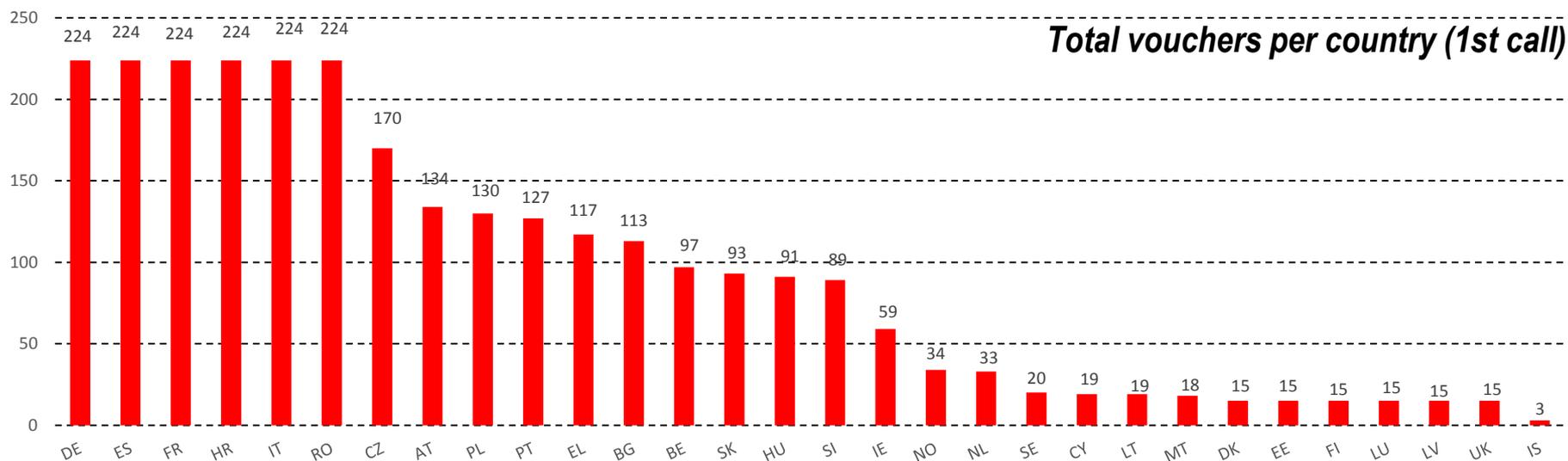
European Commission

EU harmonised spectrum underpins future wireless digital services within the EU

The EU harmonised spectrum for wireless broadband use amounts to 2090 MHz with a major increase coming from the harmonisation of the 26 GHz band. 41% of this spectrum was assigned for wireless broadband use across Member States at the end of 2018 (68% if the 26 GHz is excluded). While only six Member States have assigned the 700 MHz band so far (one not in full), activity is expected to increase in 2019 as many Member States are preparing the necessary assignment procedures.

Bands above 1 GHz provide additional capacity. They remain partly unassigned in many Member States, but will play an even more relevant role in the deployment of 5G services, in particular the 3.4-3.8 GHz band, which has been identified as the primary 5G band in Europe.

Lack of assignment may be due to different reasons depending on the circumstances in each Member State, such as cross-border coordination or use for defence purposes.

In this context, and in view of different regulatory conditions applicable to different bands, lack of assignment does not necessarily mean non-compliance with EU law as there may be legitimate reasons under EU law.

Assigned spectrum for wireless broadband in harmonised EU bands (April 2019)

Legend: 700 MHz, 800 MHz, 900 MHz, 1.5 GHz, 1.8 GHz, 2 GHz paired, 2.6 GHz, 3.4-3.6 GHz, 3.6 - 3.8 GHz, 26 GHz
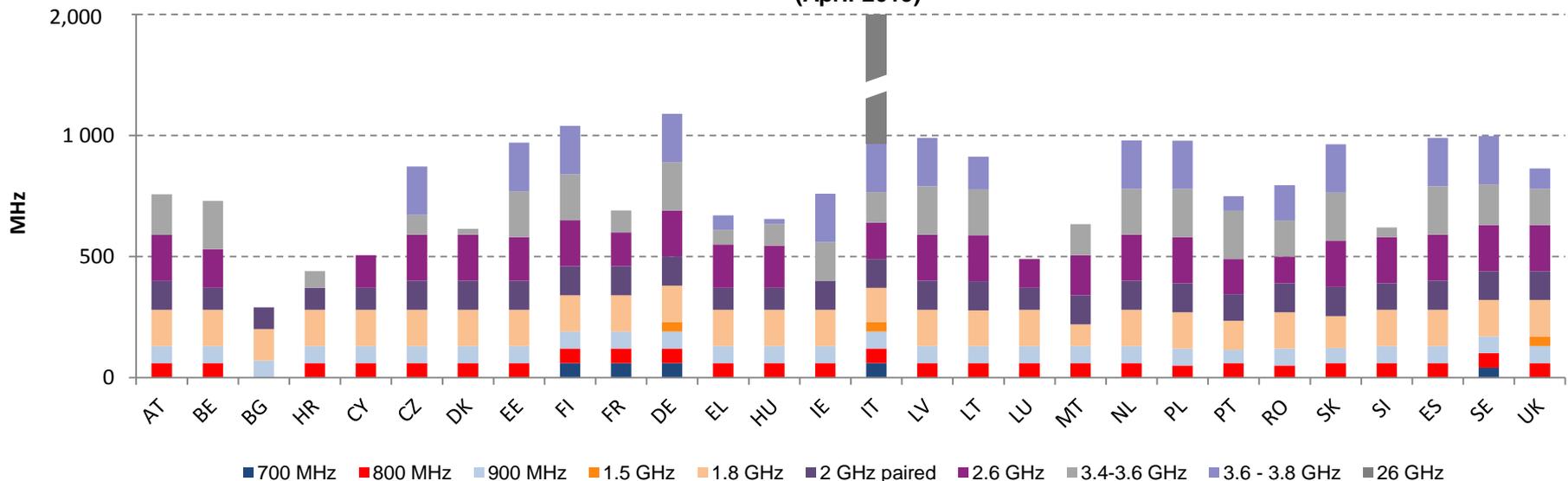
Source: Commission Services

Note: Assigned spectrum includes guard bands

European Commission

Convergent spectrum management approaches are essential to support 5G investment

700 MHz band:

Assigned in six Member States (DE, DK, FI, FR, IT*, SE). Other countries are expected to authorise the band by 30 June 2020, unless there are justified reasons for a delay until mid-2022 at the latest.**

The 700 MHz band has generated lower sale prices than the 800 MHz band in most Member States (except in France, where four mobile network operators were competing, and Sweden, where only 40 MHz was made available). Initial licences last slightly longer, with an average of 17.4 years.

3.4-3.8 GHz band:

Assigned (at least partially) in 25 Member States. Current uses vary, six Member States have assigned the band (at least partially) based on '5G conditions' in accordance with Decision (EU) 2019/235. The IT auction provided 2 blocks of 80 MHz and 2 blocks of 20 MHz, and the price paid was significantly higher than in other countries.

26 GHz band:

Currently only assigned for 5G use in Italy with 5 lots of 200 MHz.

The European Electronic Communications Code provides for a common deadline to authorise and ensure that the 3.6 GHz and 26 GHz bands can be used by the end of 2020; 700 MHz will be for wide coverage, 26 GHz for high local capacity and speed, and 3.6 GHz as the primary and universal spectrum band.

The 800 MHz band (the 'digital dividend') is currently assigned in all Member States (in two cases only partially) except in Bulgaria, which benefits from the exception due to incumbent military use under Article 1(3) of the Radio Spectrum Policy Programme.

The Commission adopted Implementing Decision (EU) 2018/661 on the extension of the 1.5 GHz band to provide 50 MHz of additional download capacity for 5G services.

The Commission adopted Implementing Decision (EU)2019/235 to update the relevant technical conditions applicable to the 3.4-3.8 GHz band to make the band 5G-ready as it has been identified as the primary pioneer band for 5G in the EU.

The Commission adopted Implementing Decision (EU)2019/784 to harmonise the technical conditions applicable to the 26 GHz band (24250-27500 MHz). This band will be essential for some of the envisaged 5G use cases such as enhanced mobile broadband, specific vertical services that require short response times and extremely high data rates and fixed wireless access for the provision of high-speed internet to households and businesses in areas with limited availability of fixed broadband technology.

It is an established Union policy, enshrined inter alia in a number of recitals (e.g. 99, 134, 135) and Articles (e.g. 53, 54) of the EECC that authorisation conditions conducive to investment in 5G deployment should avoid extracting excessive capital from the market, promote ambitious infrastructure roll-out targets (including along rail and roads), enable innovative services, create opportunities for vertical services to access spectrum, not artificially limit or apportion spectrum supply, in particular in the 3.4-3.8 GHz band where large blocks of spectrum should be made available to operators to unleash the full 5G potential.

* The 700 MHz spectrum will be available for use in Italy from July 2022 as the authorities have invoked an exception as provided in Decision of the European Parliament and the Council on the use of the 470-790 MHz band in the Union.

** A limited list of justified reasons is contained in the annex of the Decision of the European Parliament and the Council on the use of the 470-790 MHz band in the Union.

European Commission

Ex ante market regulation: state of play

With the exception of the termination markets (covered in the future by a delegated act), *ex ante* market regulation is largely concentrated in the broadband markets.

Nevertheless, it is still maintained in a few Member States for markets included in the 2003 and the 2007 recommendations on relevant markets.

The infringement proceedings launched in 2017 against seven Member States for delays of more than 5 years in conducting the periodic reviews are still ongoing against Ireland and Poland.

Article 7 cases as at 15/02/2019

Legend:
- Green: Effective competition - no ex ante regulation
- Red: No effective competition - ex ante regulation
- Yellow: 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

Country	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	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 7	ex-Mkt 10	ex-Mkt 14	ex-Mkt 15	ex-Mkt 18
Austria	3	4	5	5	5	4	4	4	1	2	1	4
Belgium	3	3	3	3	1	3	2	1	2	1	1	1
Bulgaria	5	3	2	2	3	3	3	1	1	1		
Croatia	2	2	1	1	1	2	2	1		1		
Cyprus	2	3	4	4	3	3	3	2	3	3	3	3
Czech Republic	4	4	4	4	3	4	4	2	1	1	1	2
Denmark	4	4	4	4	4	4	4	2	1	1	1	1
Estonia	4	4	4	4	3	3	3	1	1	2	1	3
Finland	2	1	4	4	1	2	3	2	2	1	V	3
France	5	5	5	5	3	5	5	2	1	2	W	4
Germany	5	5	3	3	2	3	3	2	2	1	1	4
Greece	3	4	4	4	2	3	3	2	3	2	1	1
Hungary	4	5	4	4	4	6	4	3	2	2	2	2
Ireland	3	1	4	3	2	3	2	2	2	1	1	2
Italy	3	5	3	3	2	3	2	2	2	2	2	2
Latvia	5	4	4	4	3	2	2	3	2	1	1	1
Lithuania	4	3	3	3	2	1	3	1	2	2	1	6
Luxemburg	3	4	3	3	2	3	3	2	1	1	1	
Malta	4	4	2	2	3	3	3	3	2	2	2	1
Netherlands	5	5	6	4	3	4	3	2	2	2	1	2
Poland	2	3	4	3	1	3	3	2	1	1	2	3
Portugal	3	3	3	3	3	2	2	1	1	3		2
Romania	3	3	2	1	2	2	2		2			2
Slovakia	4	5	3	3	3	4	4	2	2	1	1	2
Slovenia	2	5	4	4	2	3	3	2	2	1	3	3
Spain	3	4	3	3	3	4	3	2	2	4	2	3
Sweden	4	4	4	3	3	3	3	2	2	1	1	4
United Kingdom	3	5	3	5	4	5	4	4	2	4	1	2

European Commission

Member States' implementation of the net neutrality rules (Regulation (EU) 2015/2120) 1/2

Net neutrality rules

Under the EU net neutrality rules, Europeans are entitled to 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 a mere administrative decision. Specific BEREC guidelines and close cooperation between national regulatory authorities, BEREC and the Commission help consistently apply the rules throughout the EU.

Regulatory developments

The Commission prepared the report on Articles 3, 4, 5 and 6 of the Regulation which was submitted to the co-legislators on 30 April 2019. To this end, the Commission ordered a study on the implementation of the net neutrality provisions of the Telecoms Single Market Regulation (SMART 2017/0011) in 2018 and organised a stakeholder workshop. BEREC issued its opinion on the evaluation of the application of the Regulation and the BEREC net neutrality guidelines. All stakeholders agree that the Regulation should not be reopened at this stage and that some further clarifications are needed in the BEREC guidelines.

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 latest annual country reports on open internet from national regulators covering the period 1 May 2017 to 30 April 2018 are available at: https://ec.europa.eu/digital-single-market/en/news/annual-country-reports-open-internet-national-regulators

European Commission

Member States' implementation of the net neutrality rules (Regulation (EU) 2015/2120) 2/2

Net neutrality issues

In 2018, national regulatory authorities continued their analysis of individual commercial offers emerging on the market on a case-by-case basis. In many Member States (including CY, EL, LT, PT, BG, AT, IT, DE, RO, SI, SE, HR, CZ), they concluded formal investigations/intervened in the existing market practices.

In 2018, the first cases were decided by the national courts: BG (transparency), DE (limitation of video traffic speed as well as unequal treatment of zero-rated data usage in roaming), SE (free use of zero-rated content when end-users have used their data volume).

In NL, in a judicial dispute between a non-governmental organisation and the national regulatory authority over a specific zero-rating offer on the market, the national regulatory authority decision not to find non-compliance was upheld. In HU, a first case was referred to the Court of Justice of the European Union (throttling of content that is not zero-rated while offering full access to zero-rated applications). In BG, the first financial penalties were imposed (infringement of transparency rules).

Court cases, national regulatory authority decisions and policy rules and publications by subject
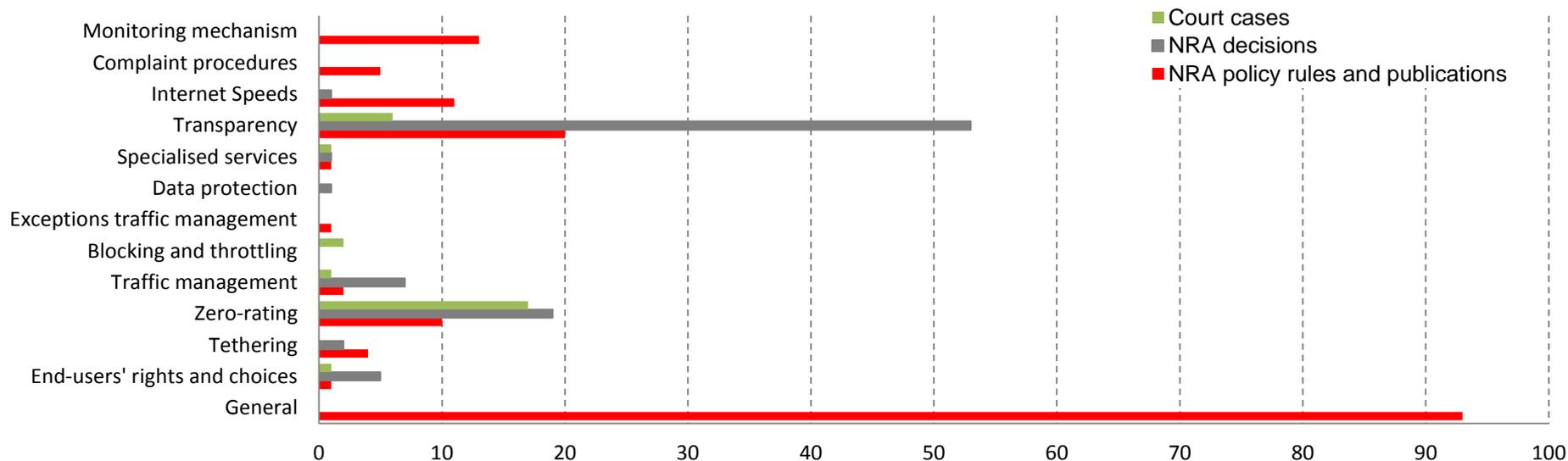
Bird & Bird, Smart 2017/0011

European Commission

Widespread use of roam-like-at-Home (RLAH) & multiplication of roaming traffic under RLAH

Since 15 June 2017, except in a few cases duly authorised by national regulators to avoid any increase in domestic prices, mobile operators in the EU/EEA are not allowed to levy any roaming surcharges for any fair usage of roaming services by their customers.

We have seen broadly successful implementation of the new roaming rules, overall consumer satisfaction, and a significant increase in travelers' roaming data consumption as well as substantial increases in roaming voice calls since 15 June 2017. According to the latest BEREC International Roaming Benchmark Report, the average retail revenue per user has increased slightly overall in the EU/EEA since June 2017.

National regulatory authorities are responsible for monitoring and enforcing EU roaming rules in the Member States. It is therefore necessary that they are conferred in all Member States with the appropriate sanctioning powers in case of non-compliance with those rules.

According to the report, more than 96% of EU/EEA subscribers are roaming-enabled. About 90% of the roaming traffic in the EU/EEA is 'roam-like-at-home'. Sustainability derogations have been granted by national regulators to operators falling into categories that were meant to be likely candidates for the derogation, i.e. some mobile virtual network operators in several countries and some mobile network operators in some of the very low data price countries with high roaming imbalances and/or low revenue per user (EE, LT, FI, PL).

Even in the latter countries, roaming traffic subject to the small surcharge makes up less than 30% of roaming traffic (except for LT). In total, less than 1% of EU/EEA roaming data traffic (less than 4% for voice) is subject to a small roaming surcharge due to a derogation (RLAH+).

According to the report, in summer 2018 roaming data traffic was multiplied by 12 in the EU/EEA compared to summer 2016 (last summer before RLAH, see below figure). For voice, the increase in roaming traffic was by a factor 3. The increase in outbound roaming traffic has been particularly high for PL, RO, LV, BG, HR and ES operators.

EEA retail roaming data traffic (millions of GB)
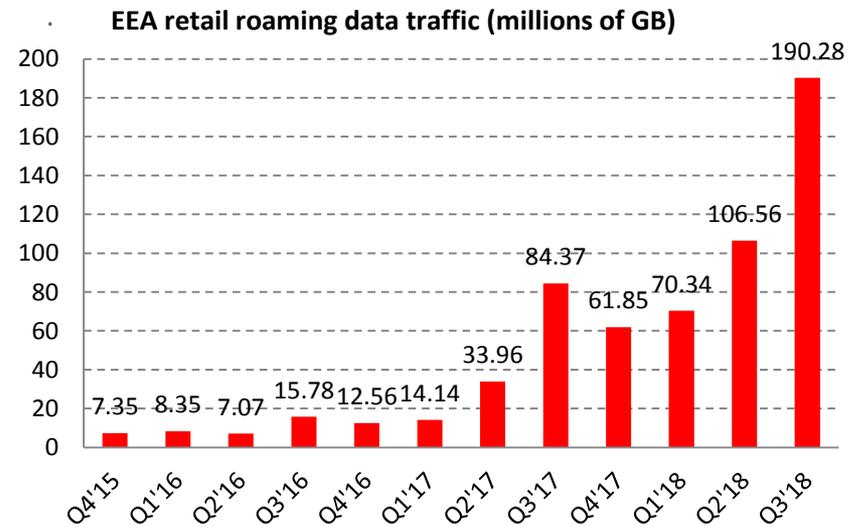
Source: International Roaming BEREC Benchmark Data Report BoR(19)21, April 2018-October 2018

European Commission

Emergency Communications and the single European emergency number 112

The main findings based on the COCOM 112 implementation report:

The share of emergency calls to the Single European emergency number 112 is rising, which shows the increasing preference of Europeans to use this number for emergencies. 112 calls increased 5% in one year, while the total number of emergency calls dropped 2.5%. 112 calls represented 48% of emergency calls.

Accuracy of caller location continued to improve in the reporting period. Advanced Mobile Location (AML) handset-based caller location solution took off in Malta and Slovenia. AML is currently deployed in Belgium, Estonia, Finland, Ireland, Lithuania, Malta, Slovenia and the UK. The Commission helps develop it by financing AML deployment in Germany, Denmark, France, Croatia, Hungary, Portugal and Sweden, increasing the number of AML countries to 15.

23 Member States reported that calls to emergency services were answered within 10 seconds.

26 Member States reported that they already have a public warning system in place. The technologies deployed include: sirens in 16 Member States; TV, radio or social media alerts in 10 Member States; specific applications in 5 Member States; SMS alerts in 5 Member States, and cell broadcast in 4 Member States.

23 Member States reported the implementation of alternative access to emergency services for users with disabilities through SMS. Meanwhile, some emergency applications deployed can provide much better location information and additional features. The information received from Member States reveals a number of potential implementation issues with equivalent disabled access to emergency services. In addition to the basic problem of the lack of an appropriate service to ensure two-way interactive communication, there are Member States where solutions that meet minimum requirements are not deployed throughout the whole territory or are not available at all times of the day. User location information for disabled users is also not available in 14 Member States.

Deployment of Advanced Mobile
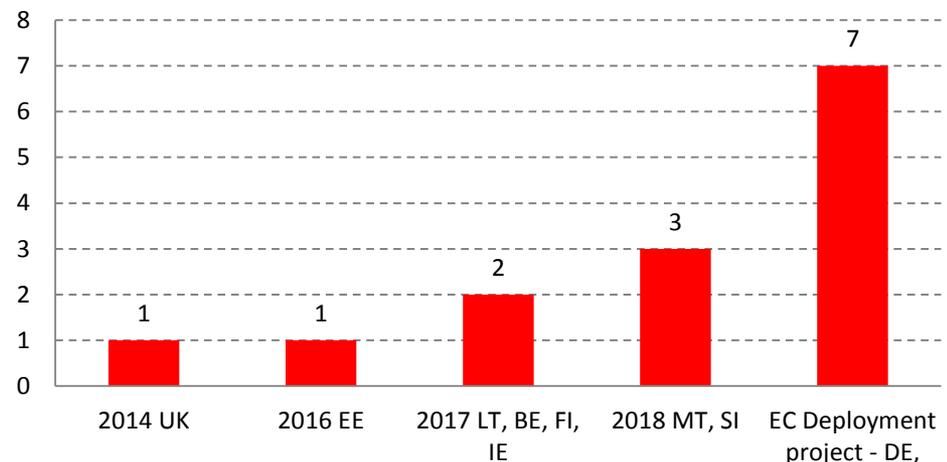
Source: COCOM 19-04 working document

European Commission

The 5G scoreboard shows overall progress on implementation of the 5G Action Plan in Europe.

Situation as of April 2019
Sources: Idate Digiworld, Communications Committee

5G roadmaps and national plans

10

Ten Member States have published national 5G roadmaps:

- Austria
- Estonia
- Finland
- France
- Germany
- Luxembourg
- Netherlands
- Spain
- Sweden
- UK

5G PIONNER SPECTRUM

14.1%

	Assigned and usable in 2020	Assigned but not usable in 2020	Not assigned
700 MHz	16.7%	3.6%	79.8%
3.4–3.8 GHz	21.9%	0%	72.1%
26 GHz	3.6%	0%	96.4%
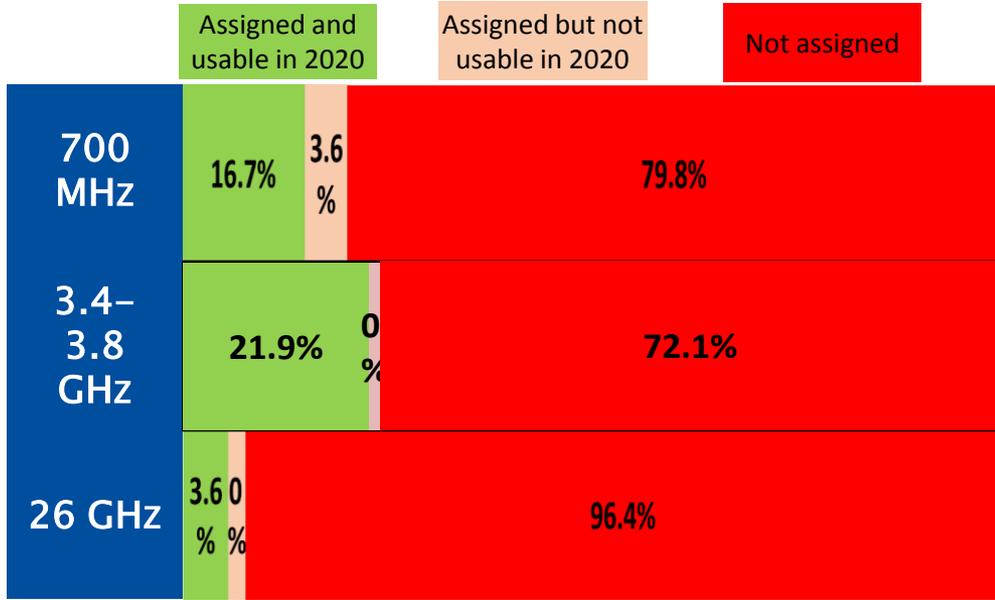
5G TRIALS

147

147 5G trials in the 28 MSs

Number of trials (November 2018)
- More than 10
- Between 5 and 10
- Between 1 and 5
- Unknown # of trials
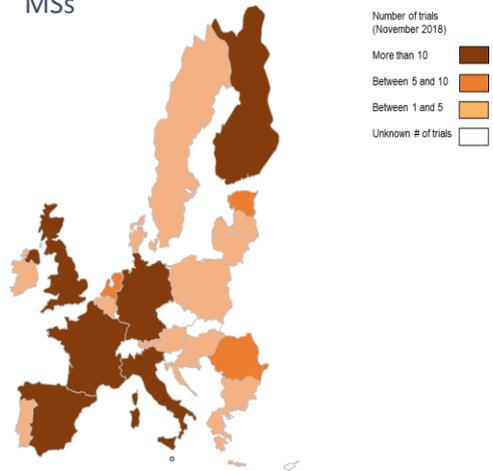
5G CITIES

35

35 5G-enabled Cities identified

5G CORRIDORS

10

10 "digital cross-border corridors" established

- 5G Cross-Border corridors
- Corridor maps develop constantly in accordance with Member States' new agreements
- H2020 5G Cross-Border corridor projects

DK-SE-FI-NO
LT-LV-EE
PL-LT
BE-NL
FR-LUX-DE 5GCROCO
5GCARMEN
DE-AT-IT
ES-PT 5G-MOBIX
EL-BG-RS

DESI Report 2019 – Connectivity

European Commission
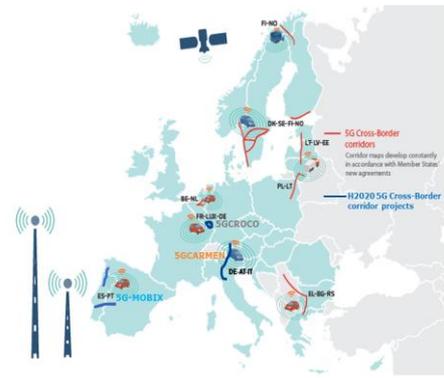
The 5G scoreboard is made up of five different elements relevant for the deployment of 5G in Europe based on the 5G Action Plan.

National 5G deployment roadmaps or strategies
• National calendars for key 5G milestones set by the government, usually prepared as part of national broadband plans;
• The source for this information is the Communication Committee.

5G trials
• The number of trials is based on the publicly available information on the pre-commercial 5G trials and pilots launched in Europe as part of the industry's 5G trial roadmap

The elements of the 5G Observatory

5G cities
• European cities, where commercial 5G services have been concretely announced by operators or where major 5G city pilots in view of a commercial service launch are taking place;
• The numbers are based on the information provided by the Communication Committee.

5G spectrum assignments
• The three so-called 5G pioneer spectrum bands identified in Europe are the 700 MHz, 3.6 GHz and 26 GHz bands;
• The data on the spectrum assignments in each band is based on the results of the spectrum auctions or other reward processes, and confirmed by the Member States;
NB: the scoreboard values may be based on more recent information than what is used in the country-specific 5G readiness indicator within the DESI connectivity index.

5G corridors
• The "5G cross-border corridors" are large-scale segments of highways running across two or more national borders where 5G connectivity systems applied to Connected and Automated Mobility solutions and use cases are tested;
• The test corridors in the scoreboard are based on bilateral agreements for enhanced cross-border cooperation that Member States have signed and/or are included in H2020 research and innovation projects.

More information on the current state of play is available on the European 5G Observatory.

European Commission

The map of 5G digital cross-border corridors shows the test corridors identified by the Member States and included in Horizon 2020 research and innovation actions.

FI-NO

DK-SE-FI-NO

LT-LV-EE

PL-LT

BE-NL

FR-LUX-DE
5GCROCO

5GCARMEN
DE-AT-IT

ES-PT 5G-MOBIX

EL-BG-RS

5G Cross-Border corridors

Corridor maps develop constantly in accordance with Member States' new agreements

H2020 5G Cross-Border Corridor projects

The number of reported 5G trials in the EU and 5G cities identified by the Member States are shown in this map.

Number of 5G trials
(March 2019)

More than 10

Between 5 and 10

Between 1 and 5

Unknown # of trials

The number of 5G-enabled cities (as of January 2019) in each Member State is indicated by the numbers in this map.

European Commission
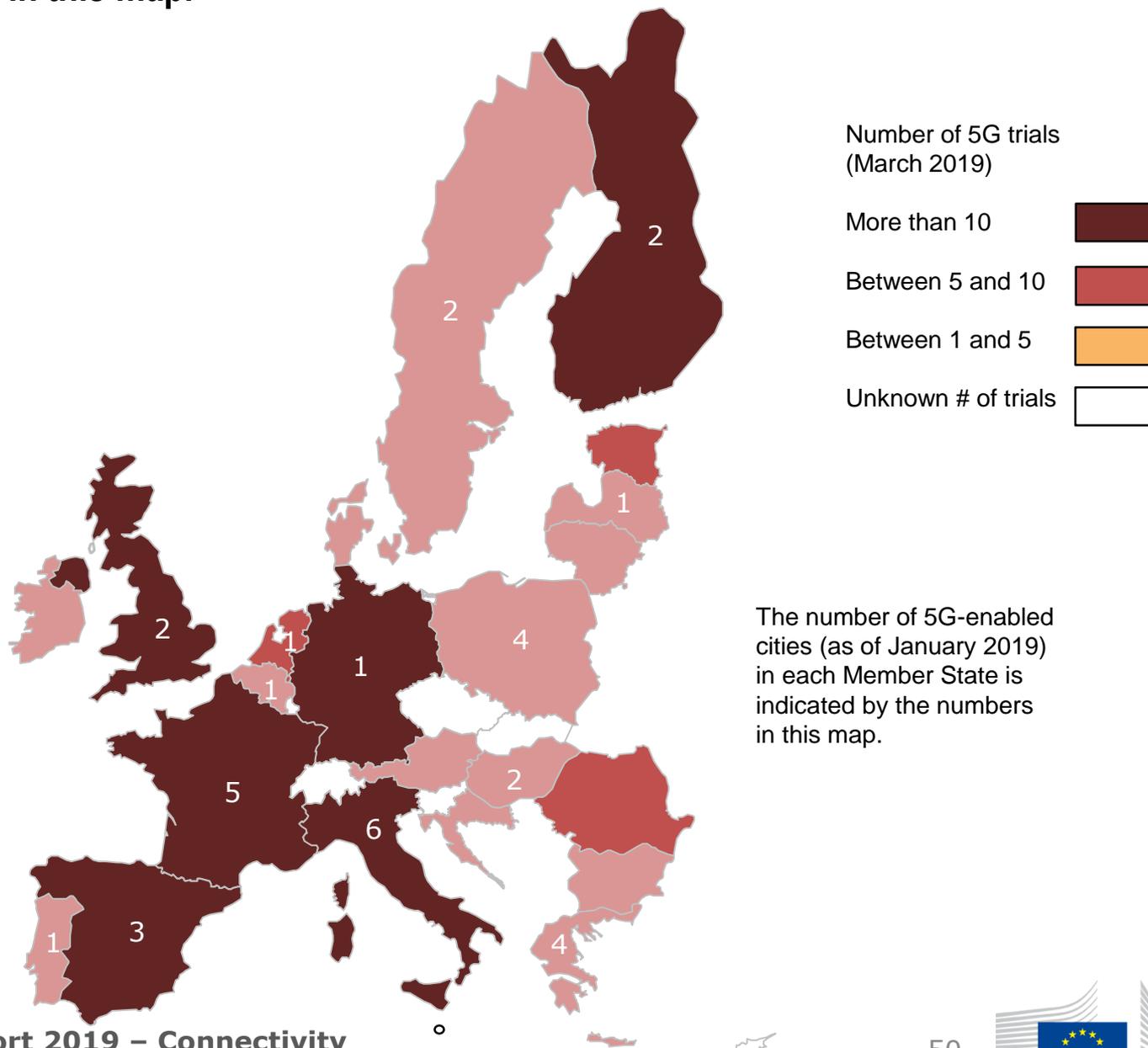
The 5G readiness indicator in the DESI shows the portion of spectrum that has been assigned for 5G purposes in each Member State in the so-called pioneer bands.

The percentage score of the 5G readiness indicator is based on the amount of spectrum that has been assigned in a specific Member State and ready for 5G use by the end of 2020 within the so-called 5G pioneer bands identified in Europe;

The percentage is calculated based on the amount of spectrum assigned in each 5G pioneer band in comparison with the maximum feasible amounts, which are as follows:

- 700 MHz band: 60 MHz (703-733 & 758-788 MHz)
- 3.6 GHz band: 400 MHz (3400-3800 MHz)
- 26 GHz band: 1000 MHz within 24250-27500 MHz

All three spectrum bands have an equal weight, so having the maximum spectrum amount assigned – and ready for 5G use – in the range of one of these bands will result as 33.3%.

Remarks

1. For the 700 MHz band, there are a number of derogations allowing for a delay until 2022; however, 5G readiness indicator is about factual reporting, not a judgement on legal compliance;

2. For the 3 400-3 800 MHz band, only licences aligned with the new technical conditions (according to Commission Decision (EU)2019/235) were considered ready for 5G use;

3. For the 26 GHz band, at least a portion of 1000 MHz within the band shall be assigned and ready for 5G use by the end of 2020, as required by the European Communications Code.

5G readiness (assigned spectrum as a % of total harmonised 5G spectrum)
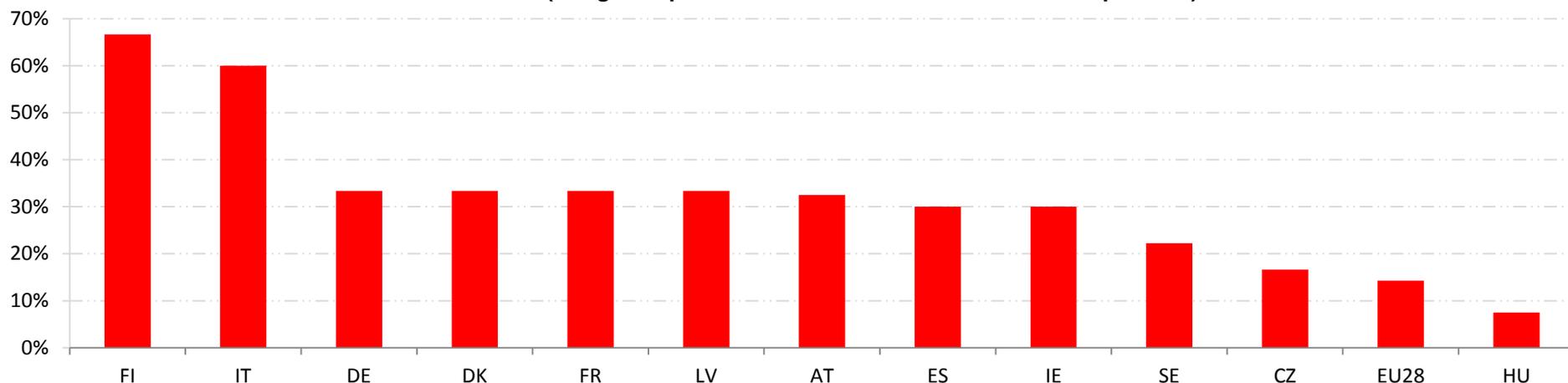
Source: Idate Digiworld, Communications Committee

European Commission