



The European Broadband Scorecard 2015 – Update

Research Document

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About this document

This document is an **update to complete Ofcom's fourth European Broadband Scorecard, published in December 2015**, with previous reports having been published in 2013, 2014 and 2015. The Scorecard is intended to document aspects of fixed and mobile broadband performance across other EU countries for the purpose of measuring and comparing the UK's relative performance. It was proposed by Broadband Delivery UK (BDUK), part of the Department of Culture, Media & Sport (DCMS), before being taken up by Ofcom.

The Scorecard reports on coverage, take-up and use, price, speed and choice, where sufficiently comparable, reliable and consistent data are available.

It draws on three main sources of data: the EC Digital Agenda Scoreboard 2015 which provides data on coverage, take-up and choice relating to year-end 2014; Eurostat data on fixed broadband household take-up and online activities relating to Q2 2015; and Ofcom analysis of pricing data sourced from Teligen, relating to July 2015.

The main body of the report focuses on the EU 5 countries (Germany, France, Italy, Spain and the UK) while data on the EU 28 are included as an Annex.

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Section 1

Introduction

1.1 Background to the European Broadband Scorecard

In December 2010 the Department for Culture, Media & Sport (DCMS), in partnership with the Department for Business, Innovation & Skills (BIS), published a strategy document entitled *Britain's Superfast Broadband Future*.

The document set a commitment to benchmark the UK against other EU countries, and set out the Government intentions to ensure that all UK premises could experience download speeds of at least 2Mbit/s by 2015 and that 90% of premises could access broadband with headline (advertised) speeds of 'up to' 24Mbit/s or higher. To this end, it allocated £530m to Phase 1¹ of the Broadband Delivery UK (BDUK) Broadband Programme (formerly known as the Rural Broadband Programme),² designed to provide faster speed broadband coverage beyond commercial operators' existing network footprints, focusing on rural areas.

In February 2014 DCMS announced Phase 2, an additional £250m allocation to extend ≥24Mbit/s broadband coverage to 95% of UK premises by 2017, and provided £10m to fund pilot projects seeking to provide an alternative broadband solution for the final 5% of UK premises. Figures released in August 2015 reveal that more than three million homes and businesses have been covered by the Government's nationwide roll-out of ≥24Mbit/s broadband.³ This is on track with the Government's target of 95% of UK premises having access to ≥24Mbit/s broadband by 2017.

Eight market-testing pilot projects (using a £10m market-testing fund) have also begun, to explore options for extending superfast broadband beyond 95%, as part of Phase 3 of the Superfast Broadband Programme. These pilots will run until March 2016.⁴

In November 2015, the Government announced the introduction of a Universal Service Obligation for broadband, with ambitions to ensure people are given the legal right to request broadband with a speed of at least 10Mbit/s to all UK premises by 2020.⁵

There are also a number of measures in place to increase mobile broadband coverage. The licences for some of the 4G mobile spectrum that was auctioned by Ofcom in 2013 included coverage obligations. One of the licences requires the holder, Telefónica UK Ltd (O2), to provide indoor reception to at least 98% of the UK population and at least 95% of the populations of each of the UK nations. In February 2015, when Ofcom varied the licences of the UK's four mobile network operators, EE, Three and Vodafone indicated that they intended to match O2's 98% indoor coverage obligation for 4G mobile by the end of this

¹ See http://www.culture.gov.uk/what_we_do/telecommunications_and_online/7763.aspx.

² BDUK is part of the Government's investment and policy approach to bringing forward network infrastructure upgrades and to improve the accessibility of services in locations where there is a weak commercial investment case. It is a team within DCMS created to deliver policies relating to stimulating private sector investment. See <https://www.gov.uk/broadband-delivery-uk>

³ See <https://www.gov.uk/government/news/three-million-more-uk-homes-and-businesses-can-now-get-superfast-broadband>.

⁴ See https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/409858/15-02-09_BDUK_Summary_of_feasibility_phase_final_1_.pdf.

⁵ See <https://www.gov.uk/government/news/government-plans-to-make-sure-no-one-is-left-behind-on-broadband-access>.

year. In addition, the DCMS £150m Mobile Infrastructure Project (MIP) is currently under way, to improve mobile coverage across the UK, particularly focusing on rural areas.

Within DCMS, BDUK proposed a Scorecard for measuring the development of the UK's broadband network,⁶ relative to those in other EU countries, based on four headline indicators: coverage and take-up, speed, price and choice. In December 2011 Ofcom agreed to identify, collate and publish the best available data relating to each of these metrics.⁷ We revised BDUK's framework, separating 'coverage and take-up' and including information on the proportion of the population that use the internet and perform tasks online.

Definitions of broadband continue to develop. In particular, the term 'superfast' is subject to a number of definitions. To minimise potential confusion, in this year's report we have made clarifications to some definitions removing the term 'superfast' and replacing it with more appropriate text, such as 'superfast product'.⁸ The updated metrics table, including these clarifications, is below.

The data regarding 'standard broadband' are sourced from the European Commission's (EC) Digital Agenda Scoreboard 2015. The EC's definition for standard broadband is 'a fixed-line technology theoretically capable of providing headline download speeds of at least 144kbit/s and less than 30Mbit/s'. We use this definition in this report to allow us like-for-like comparisons with the countries included in the EC's data.

'Next generation access' (NGA) connections refer to newer technologies over which connections can be provided. Fibre-to-the-cabinet (FTTC), fibre-to-the-premises (FTTP) and DOCSIS3.0 cable connections all fall under the NGA definition. NGA technologies are capable of providing download speeds of over 30Mbit/s, although not all connections that are provided through a NGA technology will necessarily be able to provide these speeds (particularly the case with FTTC).

⁶ See Broadband Delivery Programme: Delivery Model, September 2011, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/376431/BDUK_Delivery_Programme_Delivery_Model.pdf.

⁷ Ofcom, *International Communications Market Report 2011*, 2011, p. 43, <http://stakeholders.ofcom.org.uk/binaries/research/cmr/cmr11/icmr/ICMR2011.pdf>.

⁸ The Ofcom definition of 'superfast' broadband is those connections with actual modem sync speeds of 30Mbit/s or higher. A 'superfast product' refers to a connection with advertised headline speeds of 30Mbit/s or higher.

Figure 1 Ofcom’s metrics for this Scorecard: 2015

Coverage	Take-up and usage	Speed	Price	Choice
Standard broadband coverage	Standard broadband take-up	Fixed download speed	Price of standard broadband	Market concentration in fixed broadband market
Broadband coverage of NGA broadband connections	Broadband take-up of connections with a headline speed of 30Mbit/s or more	Fixed upload speed	Price of broadband connections with a headline speed of 30Mbit/s or more	Market concentration in mobile broadband market
Mobile broadband coverage	Mobile broadband take-up	Mobile download speed	Price of mobile broadband	
	Use of online services			

Source: Ofcom

Note: While Ofcom aims to include speed metrics in the Scorecard, data were not available this year. For more information please see Annex C.

The charts in this Scorecard focus on the UK’s position relative to the other EU5 countries (France, Germany, Italy and Spain). The factors that affect the development of broadband networks, such as geography, population size and density, and legacy infrastructure, differ significantly between the 28 EU Member States. For this reason we consider it more appropriate to compare the UK’s broadband network with the EU5, which provide a good benchmark for the UK, due to their greater similarity regarding the factors which affect broadband development. For completeness, however, Annex A provides EU28 data for the metrics in the Scorecard, where such data are available.

Figure 2 EU28 country codes (highlighting EU5)

Code	Country	Code	Country	Code	Country	Code	Country
BE	Belgium	EL	Greece	LT	Lithuania	PT	Portugal
BG	Bulgaria	ES	Spain	LU	Luxembourg	RO	Romania
CZ	Czech Republic	FR	France	HU	Hungary	SI	Slovenia
DK	Denmark	HR	Croatia	MT	Malta	SK	Slovakia
DE	Germany	IT	Italy	NL	Netherlands	FI	Finland
EE	Estonia	CY	Cyprus	AT	Austria	SE	Sweden
IE	Ireland	LV	Latvia	PL	Poland	UK	United Kingdom

Source: Eurostat

1.2 Challenges of providing data

Due to the complexity of gathering data across comparator countries, we face a number of practical considerations in compiling the Scorecard. These relate to ensuring that the data we publish are comparable, reliable and the most recent available at the time of preparing the Scorecard. We have applied the same considerations for this edition of the Scorecard as

we did for last year's report. Annex B sets out a range of considerations to take into account when assessing the data in this report.

For example, in relation to fixed broadband speeds metrics, while fixed-line download speed datasets are publicly available, in our opinion there are limitations in the methodologies used to obtain these datasets. This means that they may not offer comparable, robust estimates of national average fixed-line download speed. For this reason we have not included the data in this Scorecard. We discuss the availability of broadband speed data further in Annex C.

In order to use the most recently available data, charts in Ofcom's European Broadband Scorecard relate to three different time-periods, and have been labelled accordingly.

- The EC Digital Agenda Scoreboard 2015 provides data on coverage, take-up and choice relating to year-end 2014. We first published these results in our December 2015 publication.
- Eurostat's comprehensive database provides data on fixed broadband household take up and online activities relating to Q2 2015. This is the first time we have published these results.
- Pricing data relate to the period July 2015 and was first made available in our December 2015 publication.

For more information on the use of most recently available data, please refer to Annex B.

Section 2

The Scorecard

2.1 Overview

Figure 3 provides an overview of the UK's position relative to that of EU5 countries across the Scorecard's metrics (except price). The UK ranks first on all metrics except the number of fixed broadband connections per 100 people, where it ranks joint second behind France, in 4G mobile broadband coverage, where it ranks second behind Germany, and in the percentage of individuals who interacted online with public authorities within the last 12 months, where it ranks joint third with Spain after France and Germany.

Figure 3 UK's position relative to the EU5, for the previous and current Scorecard (excluding pricing)

	Data	EU5 ranking
Standard broadband coverage	95-100% (95-100%)	=1 (=1)
Broadband coverage of NGA connections	85-90% (80-85%)	1 (1)
HSPA 3G mobile broadband coverage	95-100% (95-100%)	=1 (=1)
4G mobile broadband coverage	80-85% (60-65%)	2 (3)
Fixed broadband connections per 100 households	85* (82)	1* (2)
Fixed broadband connections per 100 people	37 (34)	=2 (3)
Broadband connections with a headline speed of 'more than or equal to' 30Mbit/s per 100 people	12 (9)	1 (1)
Mobile broadband connections per 100 people	88 (88)	1 (1)
Percentage of individuals accessing the internet at least once a week	90%* (89%)	1* (1)
Percentage of individuals that have never used the internet	6%* (6%)	1* (1)
Percentage of individuals who bought or ordered goods or services online within the last 12 months	81%* (79%)	1* (1)
Percentage of individuals who interacted online with public authorities within the last 12 months	49%* (51%)	=3* (3)
Percentage of fixed broadband lines operated by incumbent	32% (33%)	1 (1)
Percentage market share of leading MNOs	30% (29%)	1 (2)

Source: EC, Digital Agenda Scoreboard 2015; Eurostat, Community survey on ICT usage in Households and by Individuals, 2015.* Updated data relating to Q2 2015 (Eurostat).

Notes: (1) Data and rankings relating to year-end 2014 and Q2 2015 are listed first. (2) Data and

rankings for year-end 2013 and Q1 2014 listed in italics and parentheses. (3) Definitions of standard and NGA broadband as well as 3G and 4G mobile broadband can be found on page 9 and 10 of this report.

In this report we use baskets of services to compare broadband prices across the EU5 countries. In the case of fixed broadband, these baskets also include fixed voice services as in many cases a landline is required in order to be able to receive fixed broadband and because they are frequently purchased together as part of a bundle. Our analysis shows that:

- Overall, the UK ranked first on fulfilling the requirements of the three stand-alone baskets of fixed broadband and landline services used in the analysis.
- The UK also ranked first when purchasing them as part of a bundle, with the exception of the basket including a fixed broadband connection headline speed of $\geq 30\text{Mbit/s}$. Germany ranked first, closely followed by Italy and the UK.
- The UK was second cheapest in terms of the lowest available prices required to fulfil the requirements of fixed broadband and landline baskets including a fixed broadband connection headline speed of 8Mbit/s and 16Mbit/s. Whereas it ranked fourth on the basket including a fixed broadband connection headline speed of $\geq 30\text{Mbit/s}$, behind Germany, France and Italy.
- In general, UK prices for standard broadband and a landline compared more favourably than those including a fixed broadband connection with a headline speed $\geq 30\text{Mbit/s}$.
- The UK ranked second on lowest available prices for mobile broadband connections offering 1GB 3G data, behind Italy. Whereas it ranked third on lowest available prices for mobile broadband connections offering 3GB 3G data and 5GB 4G data.

Figure 4 Overview of the UK's position on the Scorecard relative to the EU5: pricing, July 2015

		UK Rank	UK (£PPP)	FR (£PPP)	DE (£PPP)	ES (£PPP)	IT (£PPP)
Weighted average single-service pricing	8Mbit/s, 25GB data, 250 mins	1/5	37	47	52	66	67
	16Mbit/s, 50GB data, 250 mins	1/5	37	56	53	66	67
	30Mbit/s, 75GB data, 250 mins	1/5	45	62	58	66	68
Weighted average bundle pricing	8Mbit/s, 25GB data, 250 mins	1/5	30	37	32	45	36
	16Mbit/s, 50GB data, 250 mins	1/5	30	38	34	46	36
	30Mbit/s, 75GB data, 250 mins	3/5	37	39	36	47	37
'Lowest available' pricing	8Mbit/s, 25GB data, 250 mins	2/5	23	28	18	40	29
	16Mbit/s, 50GB data, 250 mins	2/5	23	28	22	41	29
	30Mbit/s, 75GB data, 250 mins	4/5	31	28	22	45	29
'Lowest available' mobile broadband pricing	1GB 3G data	2/5	7	7	14	11	5
	3GB 3G data	3/5	14	13	19	22	5
	5GB 4G data	3/5	17	13	28	22	9

Source: Ofcom, using data provided by Teligen.

Note: (1) Data and rankings for the UK listed in bold. (2) Weighted average single-service pricing is

the sum of the weighted average prices of the three cheapest stand-alone fixed broadband and three cheapest stand-alone fixed voice services that fulfil each basket's requirements. We weight the averages for each service by the relevant providers' market shares. (3) Weighted average bundle pricing is the weighted average of the three lowest prices for bundled fixed broadband and fixed voice services that fulfil each basket's requirements. (4) Lowest available pricing is the lowest price that a consumer could pay for each basket of services including, where appropriate, bundled services. (5) We have used three baskets including fixed broadband and fixed voice telephony in our analysis: a fixed broadband connection with a minimum headline speed of 'up to' 8Mbit/s and 25GB of data use per month, alongside a fixed line with 250 minutes of outgoing calls per month; a fixed broadband connection with a minimum headline speed of 'up to' 16Mbit/s and 50GB of data use per month, alongside a fixed line with 250 minutes of outgoing calls per month; and a fixed broadband connection with a minimum headline speed of 'up to' 30Mbit/s and 75GB of data use per month, alongside a fixed line with 250 minutes of outgoing calls per month.

2.2 Coverage

In the Digital Agenda Scoreboard 2015, the EC published coverage estimates of standard fixed-line broadband, NGA broadband and 3G and 4G mobile broadband availability for the EU5 countries at the end of 2014 (all references to the Digital Agenda Scoreboard 2015 relate to data from year-end 2014).

In acknowledgement of the difficulties of accurately measuring coverage to a single percentage point (and comparing countries where coverage levels are very similar), we report coverage figures within bands of five percentage points. For example, 97% coverage or 95% coverage will be placed in the 95%-100% coverage band.

Standard fixed broadband and NGA coverage

The EC estimates coverage of standard broadband (as the proportion of households in a region that can access a fixed-line technology theoretically capable of providing headline download speeds of at least 144kbit/s and less than 30Mbit/s), and coverage of NGA broadband.⁹ In all of the EU5 countries, at least 95% of households are in areas served by standard broadband.

Coverage of broadband from next generation access (NGA) networks that can provide headline speeds of 'more than or equal to' 30Mbit/s has increased in the UK since our last Scorecard, from 80-85% of households covered, up to 85-90%.

The UK continues to have the highest level of coverage of the EU5 countries for NGA broadband (using the Commission's data), with coverage growing faster than in the rest of the EU5. Italy has the lowest level of coverage of the EU5 (at 35-40%).

In Ofcom's 2015 *Communications Market Report*,¹⁰ published 6 August 2015, we reported that 90% of UK premises were able to receive fixed broadband services over NGA networks by May 2015, and that 83% were able to receive superfast broadband services (i.e. those with an actual download speed of 30Mbit/s or higher). We calculated this based on detailed postcode-level data inputs which were provided by UK communications providers. This methodology results in a figure very close to that used by the Commission for the UK (90% vs. the EC 89%).

⁹ Next generation access (NGA) technologies (VDSL, FTTC, FTTP and DOCSIS3.0 cable) are capable of providing 30Mbit/s (or higher) download speeds. However, not all lines served by an NGA technology will receive speeds of 30Mbit/s or higher. This is because some NGA technologies, such as VDSL, cannot deliver speeds above 30Mbit/s to all households covered by the technology.

¹⁰ Ofcom, *Communications Market Report 2015*

http://stakeholders.ofcom.org.uk/binaries/research/cmr/cmr15/CMR_UK_2015.pdf

UK NGA broadband coverage has risen quickly as a result of infrastructure upgrades by commercial network operators and the Government's broadband investment programmes. Both BT and Virgin Media have invested significantly in network upgrades; Openreach (part of BT Group) and Virgin Media's networks together now account for over 99% of all homes passed by NGA broadband.¹¹ Virgin Media has also announced plans to extend its network to approximately four million new homes by 2020.¹²

A number of other smaller providers are also building and operating NGA broadband networks, including KCOM in the Hull area, WightFibre on the Isle of Wight and a number of commercial schemes in new housing developments and community projects in rural areas.

Figure 5 Percentage of households in areas served by standard and NGA fixed broadband: year-end 2014



Source: EC, *Digital Agenda Scoreboard 2015*.

Note: (1) Data refer to year-end 2014. (2) Ofcom has banded figures within a range between the nearest integers divisible by 5. (3) 'Standard broadband' refers to xDSL, FTTP, WiMAX and cable (basic and NGA), the main fixed-line technologies capable of providing headline speeds of at least 144kbit/s and less than 30Mbit/s download speed for end-users. (4) 'NGA broadband' refers to NGA technologies, including VDSL, FTTH, FTTB and DOCSIS3.0 cable, those needed to provide 30Mbit/s download speeds for end-users.

HSPA 3G mobile broadband coverage

The EC calculates advanced 3G mobile broadband coverage in terms of percentage of households within a region that can access an HSPA-upgraded 3G network.

At least 95% of households are in areas served by 3G mobile broadband in every EU5 country except Germany, where between 90% and 95% of households are in areas with coverage. However, it is important to note that Germany generally applies a more rigorous definition of mobile coverage, which is based on actual download speeds rather than simple reception of a signal, than other countries.

4G mobile broadband coverage

The EC calculates 4G mobile broadband coverage as the percentage of households within a region that can access fourth generation mobile broadband (LTE protocol).

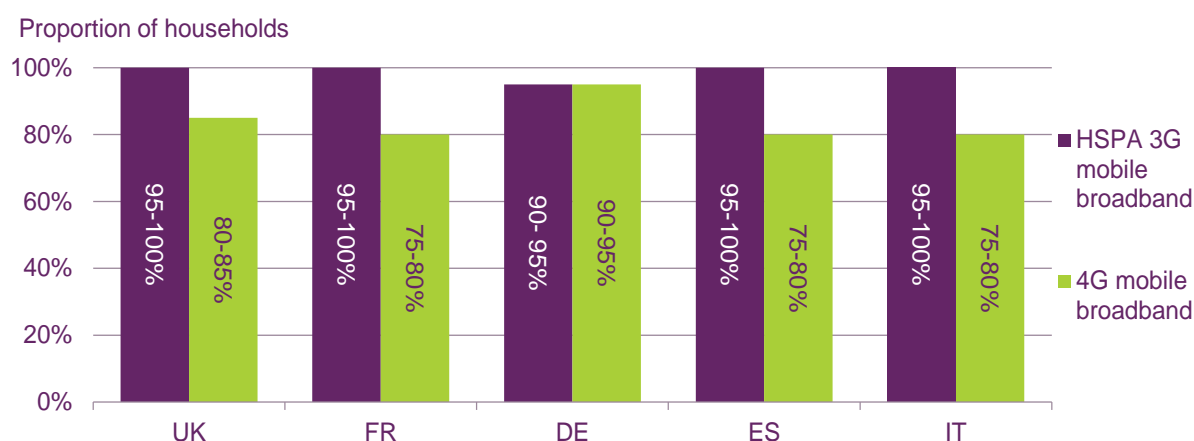
¹¹ Ofcom, *Infrastructure Report 2014* <http://stakeholders.ofcom.org.uk/market-data-research/market-data/infrastructure/infrastructure-2014/>

¹² <http://about.virginmedia.com/press-release/9467/virgin-media-and-liberty-global-announce-largest-investment-in-uks-internet-infrastructure-for-more-than-a-decade>

Germany had the highest coverage of 4G mobile broadband, with at least 90% of households being in areas with coverage. The UK ranked second, with at least 80% of households having access to 4G mobile broadband. At least 75% of households are in areas served by 4G mobile broadband in Italy, Spain and France.

This coverage continues to increase, with Ofcom data showing that, in May 2015, 89.5% of UK premises were in a 4G coverage area of at least one operator.¹³

Figure 6 Percentage of households in areas served by HSPA 3G and 4G mobile broadband: year-end 2014



Source: EC, Digital Agenda Scoreboard 2015.

Note: (1) Data refer to year-end 2014. (2) Ofcom has banded figures within a range between the nearest integers divisible by 5. (3) 'HSPA 3G mobile broadband' refers to coverage by at least one HSPA-upgraded 3G mobile network. (4) '4G mobile broadband' refers to coverage by at least one operator by advanced fourth generation mobile broadband (LTE protocol).

2.3 Take-up and use

At the time of the Scorecard's preparation, the EC's Digital Agenda Scoreboard and Eurostat offered the most recent assessments of take-up of fixed broadband and ≥ 30 Mbit/s broadband, and of mobile broadband penetration, per 100 people or per 100 households across the EU5.¹⁴

The EC measures broadband penetration per 100 people based on NRA and operator data. Its figures refer to year-end 2014 and it publishes the following relevant metrics:

- fixed broadband penetration per 100 people (Figure 7);
- broadband connections with headline speeds 'more than or equal to' 30Mbit/s per 100 people (Figure 9); and
- mobile broadband connections per 100 people (Figure 10).

Eurostat publishes survey data on the proportion of households that had access to fixed broadband in 2015, and the updated data can be found in Figure 8.

¹³ Ofcom, *Communications Market Report 2015*

http://stakeholders.ofcom.org.uk/binaries/research/cmr/cmr15/CMR_UK_2015.pdf

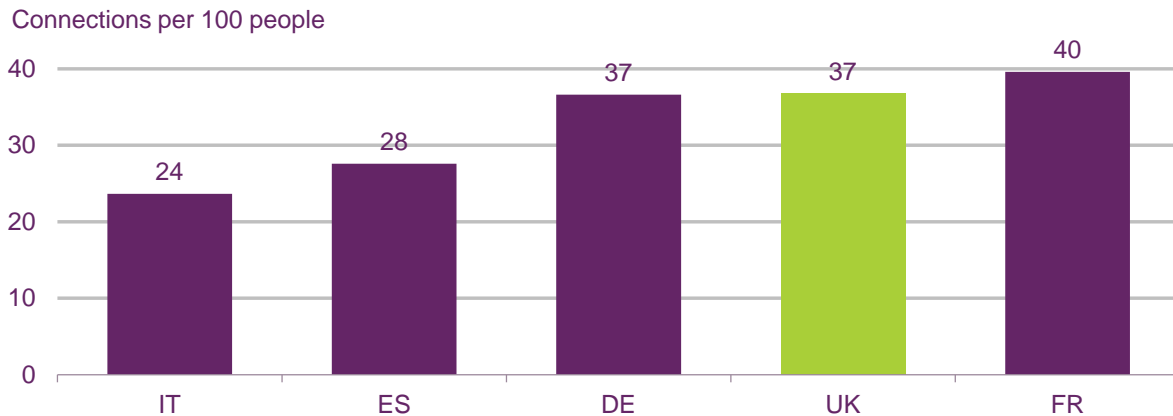
¹⁴ EC, *Digital Agenda Scoreboard 2014*, at <http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard>.

Total fixed broadband take-up

The EC reports that there were 37 fixed broadband connections (of any speed) per 100 people in the UK at year-end 2014. This was the same as Germany (37), and slightly fewer than in France (40). However, take-up in the UK was considerably higher than in Italy (24) and Spain (28).

Our own data on the number of broadband penetration connections per person, based on IHS, operator and Ofcom data and analysis, give very similar results.

Figure 7 Fixed broadband connections per 100 people: year-end 2014

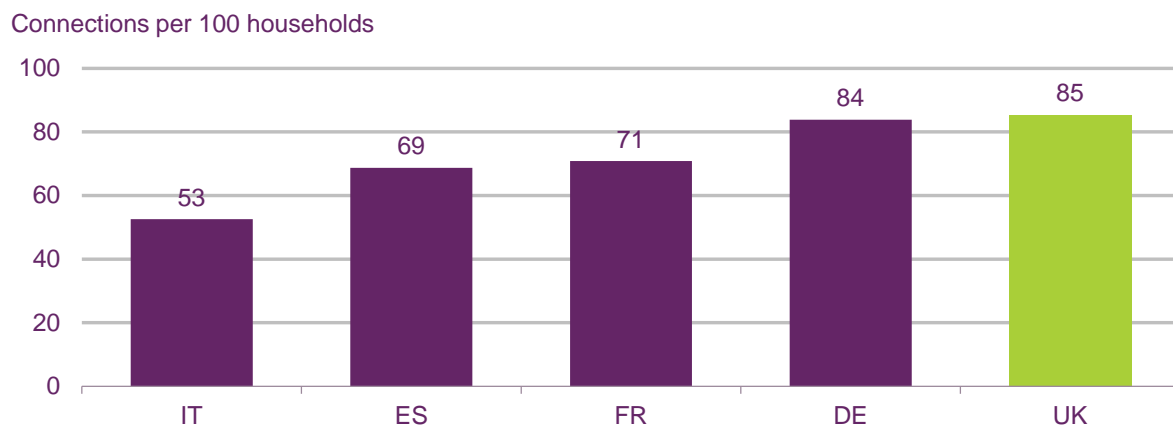


Source: EC, Digital Agenda Scoreboard 2015.

Note: (1) Data refer to year-end 2014. (2) These data refer to all forms of fixed-line broadband, including standard and 'superfast product' connections.

In terms of fixed broadband connections per 100 households, the UK's position has moved from second to first out of the EU5 in the year to Q2 2015, due to an increase of three connections, to 85. Germany ranked second, with take-up having increased by one connection per 100 households in the same period, bringing it to 84 in Q2 2015.

Figure 8 Fixed broadband connections per 100 households: Q2 2015 [Updated March 2016]



Source: Eurostat, Community survey on ICT usage in Households and by Individuals, 2015.

Note: (1) Data refer to Q2 2015. (2) These data refer to all forms of fixed-line broadband, including standard and ≥ 30 Mbit/s connections. (3) Data relate to households with at least one member aged 16-74 years.

Take-up of broadband with headline speeds of ‘up to’ 30Mbit/s or higher

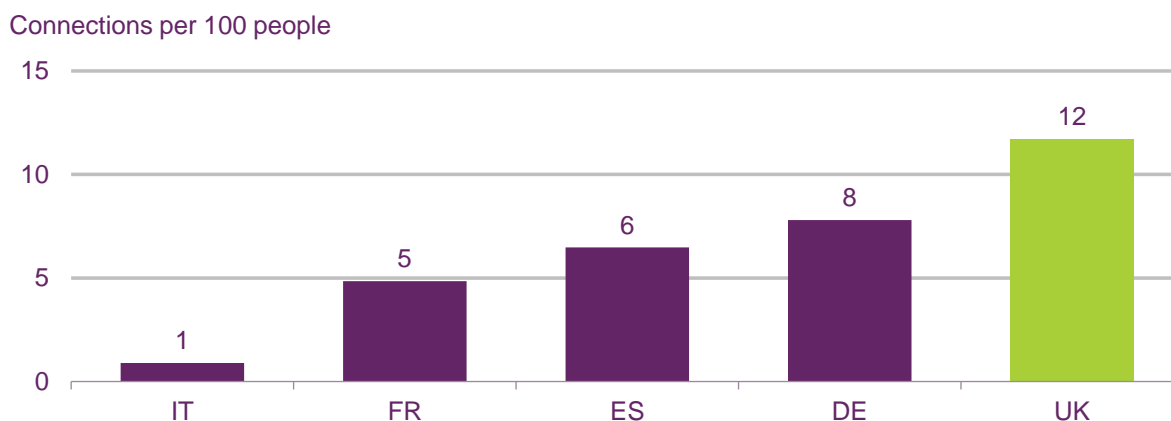
The EC reports on high-speed broadband penetration, defining this as the number of NGA broadband connections (which are theoretically capable of offering headline speeds of ‘more than or equal to’ 30Mbit/s, including FTTC, FTTP and DOCSIS3.0) per 100 people.

The EC reported that for year-end 2014, there were 12 connections with a headline speed of ‘more than or equal to’ 30Mbit/s per 100 people in the UK, the highest penetration rate among the EU5.

The high take-up of broadband with headline speeds of ≥ 30 Mbit/s in the UK can be explained in part by the greater availability of NGA connections, compared to other EU5 countries (see Figure 5 and accompanying commentary, above). It is also due in part to Virgin Media, a ‘superfast product’ broadband provider, making speed upgrades available to its existing broadband customers free of charge; no longer offering standard broadband to new customers; and launching ‘Vivid’, its new standard of ultrafast broadband that enables upgrades to speeds of up to 200Mbit/s.

Ofcom research suggests that just over three-quarters of UK homes had a fixed broadband connection at the end of 2014,¹⁵ while data provided by operators shows that 32% of residential fixed broadband connections with headline speeds of ‘up to’ 30Mbit/s or higher in November 2014.¹⁶ Combining these figures suggests that around a quarter of UK homes had a fixed broadband connection with a headline speed of ‘up to’ 30Mbit/s or higher at the end of 2014.

Figure 9 Broadband connections with a headline speed of ‘more than or equal to’ 30Mbit/s, per 100 people: year-end 2014



Source: EC, *Digital Agenda Scoreboard 2015*.

Note: (1) Data refer to year-end 2014. (2) ‘ ≥ 30 Mbit/s broadband’ refers to NGA technologies, including VDSL, FTTP and DOCSIS3.0 cable, those needed to provide 30Mbit/s download speeds for end-users.

¹⁵ Ofcom, *Technology Tracker, Half 1 (Jan-Feb) 2015*.

¹⁶ Ofcom, *UK Fixed-line broadband performance report, November 2014*

<http://stakeholders.ofcom.org.uk/market-data-research/other/telecoms-research/broadband-speeds/broadband-speeds-november2014/>.

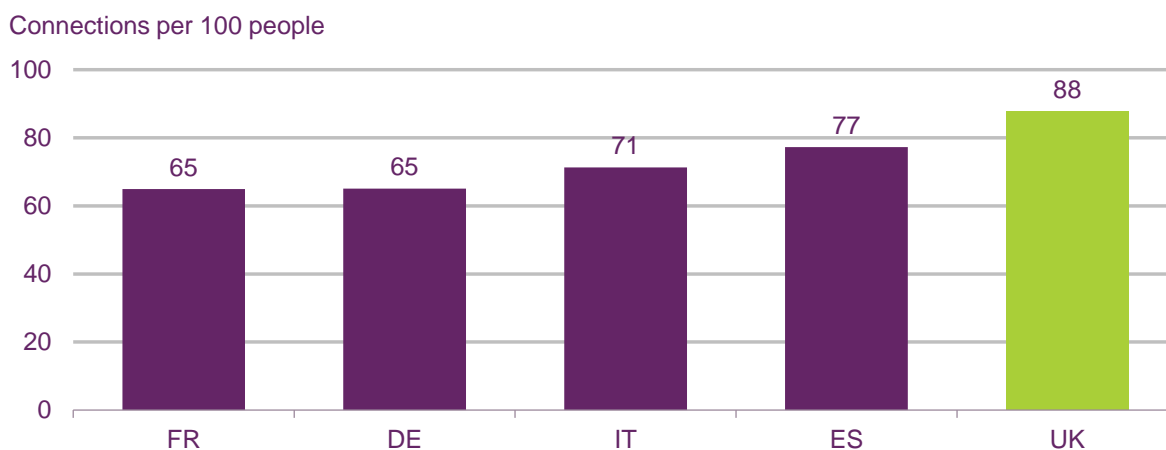
Mobile broadband take-up

The EC calculates mobile broadband penetration as the combined number of the following subscriptions per 100 people:

- subscriptions that have connected to the internet in the preceding 90 days through a smartphone or web-enabled handset;
- subscriptions to dedicated data services over a mobile network that are purchased separately from voice services as a stand-alone service (modems/dongles); and
- subscriptions to dedicated data services over a mobile network that are purchased separately from voice services as an add-on data package requiring an additional subscription.

In the UK there were 88 such connections per 100 people in December 2014, the highest rate of penetration among the EU5. Spain was next-placed with 77 connections per 100 people, followed by Italy (71), Germany (65) and France (65).

Figure 10 Mobile broadband connections per 100 people: year-end 2014



Source: EC, Digital Agenda Scoreboard 2015.

Notes: (1) Data refer to year-end 2014. (2) Data combine the number of subscriptions that have connected to the internet in the preceding 90 days through a standard mobile subscription, the number of subscriptions to dedicated data services over a mobile network that are purchased separately from voice services as a stand-alone service (modem/dongle) and the number of subscriptions to dedicated data services over a mobile network that are purchased separately from voice services as an add-on data package requiring an additional subscription. (3) Mobile broadband connections may use technologies including 3G, HSPA and LTE.

Use of online services [Updated March 2016]

Eurostat survey data covering the EU5 includes the following metrics relating to internet use:¹⁷

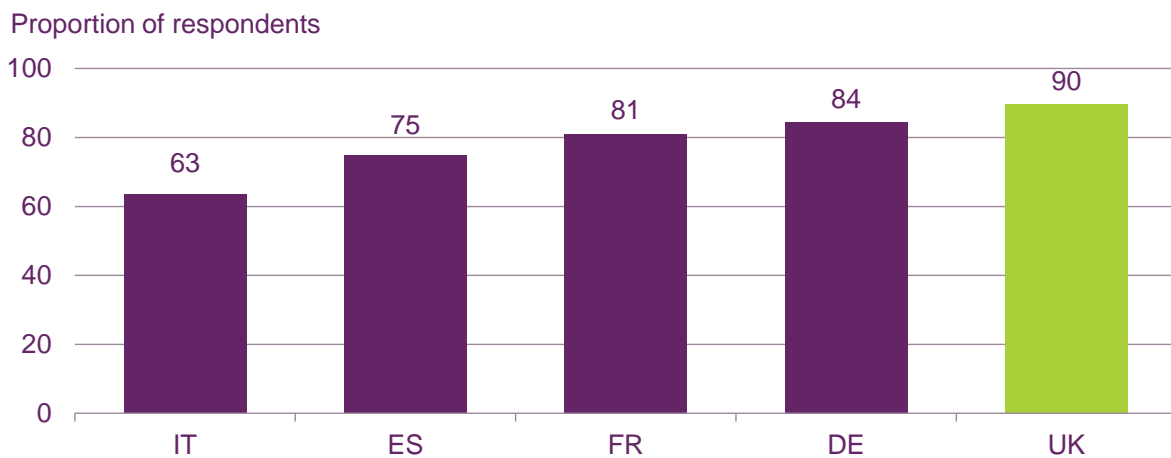
- the percentage of individuals accessing the internet at least once a week (Figure 11);
- the percentage of individuals who have never used the internet (Figure 12);

¹⁷ See Eurostat, *Community survey on ICT usage by Households and Individuals*, 2015, <http://ec.europa.eu/eurostat/web/information-society/data/comprehensive-database>.

- the percentage of individuals who have bought or ordered goods or services online in the past 12 months (Figure 13); and
- the percentage of individuals who have interacted online with public authorities in the past 12 months (Figure 14).

In Q2 2015, the proportion of individuals who accessed the internet at least once a week was 90% in the UK, a proportion higher than any other EU5 country. Italy had the lowest proportion of individuals who accessed the internet weekly (63%), followed by Spain (75%). In France and Germany, the proportions were 81% and 84% respectively. All EU5 countries showed an increase compared to the same period in Q1 2014.

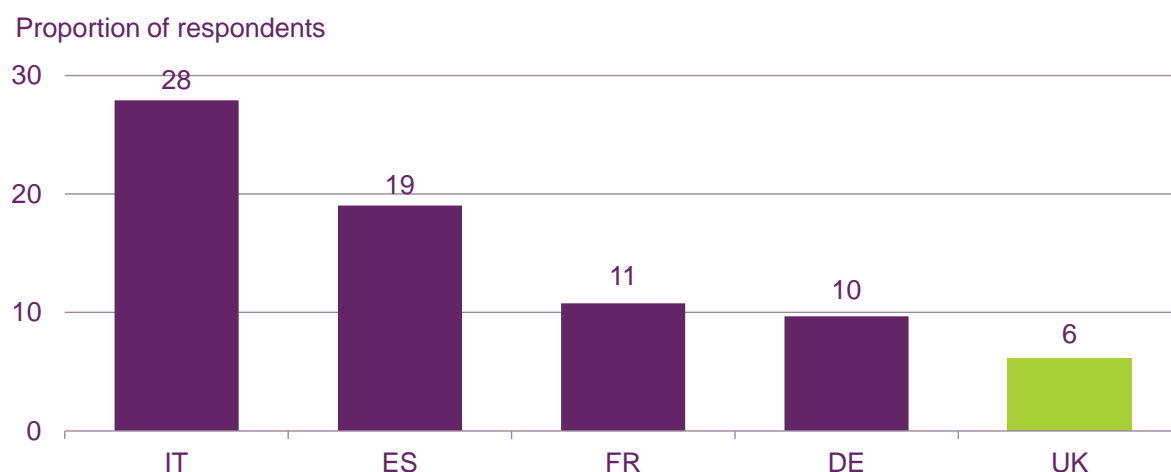
Figure 11 Percentage of individuals accessing the internet at least once a week: Q2 2015 [Updated March 2016]



Source: Eurostat, Community survey on ICT usage in Households and by Individuals, 2015. Note: (1) Data refer to Q2 2015. (2) These data cover individuals aged 16 to 74.

The UK had the lowest percentage of individuals who had never used the internet in Q2 2015 at 6%. Germany followed, at 10%, while Italy had the highest percentage of people who had never used the internet, at 28%.

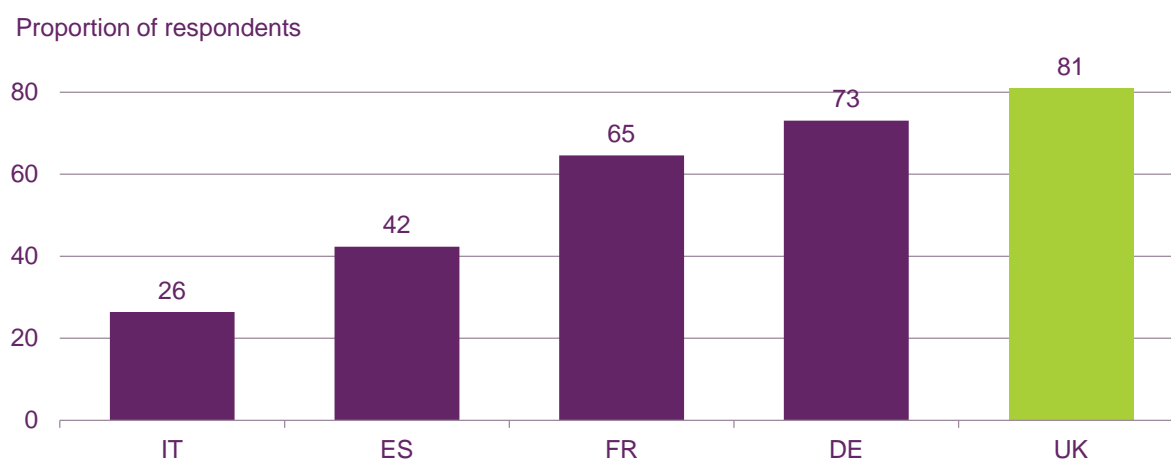
Figure 12 Percentage of individuals who have never used the internet: Q2 2015 [Updated March 2016]



Source: Eurostat, Community survey on ICT usage in Households and by Individuals, 2015.
 Note: (1) Data refer to Q2 2015. (2) These data cover individuals aged 16 to 74.

The UK had the highest percentage of individuals who used the internet for shopping (81%) of the EU5 in Q2 2015. Italy had the lowest proportion, with just over a quarter of individuals (26%) having used the internet to buy goods or services in the 12 months prior to the survey.

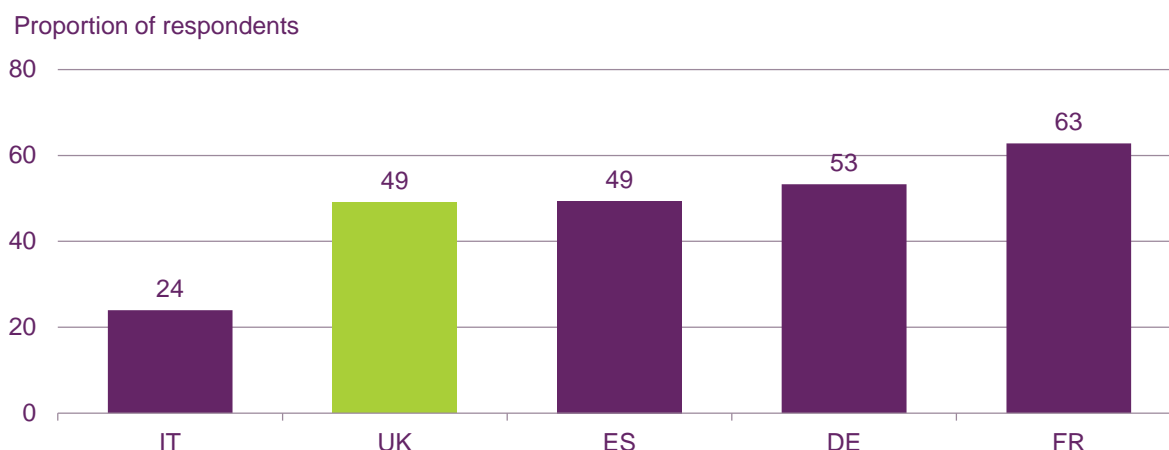
Figure 13 Percentage of individuals who bought or ordered goods or services online in the past 12 months: Q2 2015 [Updated March 2016]



Source: Eurostat, Community survey on ICT usage in Households and by Individuals, 2015.
 Note: (1) Data refer to Q2 2015. (2) These data cover individuals aged 16 to 74.

In Q2 2015, France had the highest percentage of population who had used the internet to interact with public authorities in the previous 12 months (63%), followed by Germany (53%). Spain and the UK ranked joint third, at 49%.

Figure 14 Percentage of population who had interacted online with public authorities in the past 12 months: Q2 2015 [Updated March 2016]



Source: Eurostat, *Community survey on ICT usage in Households and by Individuals, 2015*.

Note: (1) Data refer to Q2 2015. (2) These data cover individuals aged 16 to 74.

2.4 Pricing

Ofcom compares the price of communications services in the UK, France, Germany, Italy, Spain and the US in its *International Communications Market Reports*.

We do this using a model, provided by pricing consultancy Teligen, that incorporates the residential tariffs offered by the largest providers of consumer fixed broadband, fixed voice, mobile phone, mobile broadband and pay-TV services in these six countries, including bundled tariffs. Using these data, the model calculates the lowest possible monthly price at which a consumer could meet the usage requirements of pre-defined baskets of services.¹⁸ For the following analysis, the baskets may reflect special promotional offers which some communications providers put in place to attract new customers.

Using this model we have undertaken additional analysis to determine the monthly cost of three baskets of fixed broadband and fixed voice services in the EU5 countries. We present these prices in three different ways:

- **Weighted average single-service pricing.** This is the sum of the weighted average stand-alone fixed broadband and weighted average stand-alone fixed voice prices, for each basket's requirements. These averages are calculated from the lowest possible prices offered by the providers of each service, weighted by the providers' market shares (Figure 15). It is worth noting that most consumers buy fixed-line broadband as part of a bundle, and in many countries there are a limited number of operators that offer stand-alone services.
- **Weighted average bundle pricing.** This is the weighted average of the lowest prices for bundled fixed broadband and fixed voice services available from each provider which offers a service that fulfils each basket's requirements. In our analysis the average has been weighted by the providers' fixed broadband market shares (Figure 16).

¹⁸ This model, provided by Teligen, incorporates the tariffs offered by those communications providers that make up 80% of the market, by connection share, for each service in each country, or a maximum of five providers for each service.

- **‘Lowest available’ pricing.** This is the lowest price that a consumer could pay for each basket of services including, where appropriate, bundled services (Figure 17).

In general, weighted average pricing measures offer a more accurate reflection of the prices consumers are paying in a given market, as opposed to the ‘lowest available’ price, which may reflect service offerings with relatively limited availability or low take-up. However, none of the individual pricing metrics is perfect in isolation, for the reasons outlined below, so we use them in conjunction to build up an overall impression.

We have used the following baskets in this analysis:

- a fixed broadband connection with a minimum headline speed of ‘up to’ 8Mbit/s and 25GB of data use per month, alongside a fixed voice line with 250 minutes of outgoing calls per month;
- a fixed broadband connection with a minimum headline speed of ‘up to’ 16Mbit/s and 50GB of data use per month, alongside a fixed voice line with 250 minutes of outgoing calls per month; and
- a fixed broadband connection with a minimum headline speed of ‘up to’ 30Mbit/s and 75GB of data use per month, alongside a fixed voice line with 250 minutes of outgoing calls per month.

Each basket includes the relevant line rental fee for the fixed-line connection.

We have also analysed the price of mobile broadband services. Below, we display the stand-alone ‘lowest available’ prices of 3G connections providing 1GB and 3GB of data, and a 4G connection providing 5GB of data per month using a datacard or dongle (Figure 18).

We adjust all our figures for purchasing power parity (PPP) so that they have equivalent purchasing power across countries. This adjustment makes cross-country comparisons fairer. Exchange rate fluctuations and changes in PPP and basket compositions between countries since last year mean that the figures included in other Scorecards are not directly comparable to those in this one.

There are limitations to how accurately our analysis can reflect the prices that consumers actually pay:

- Weighted averages give a better reflection of the prices a country’s consumers pay because they take account of providers’ market shares. That reduces the risk of averages being skewed by cheap services which relatively few consumers take up. However, weighted averages discount those services that are not available to everyone, a metric that is measured using ‘lowest available’ pricing.
- ‘Lowest available’ pricing data reflects tariffs that may not be available to some consumers (for example, if they do not have access to the requisite infrastructure).
- Average pricing data do not give an indication of the range of prices among the tariffs from which we take the average.

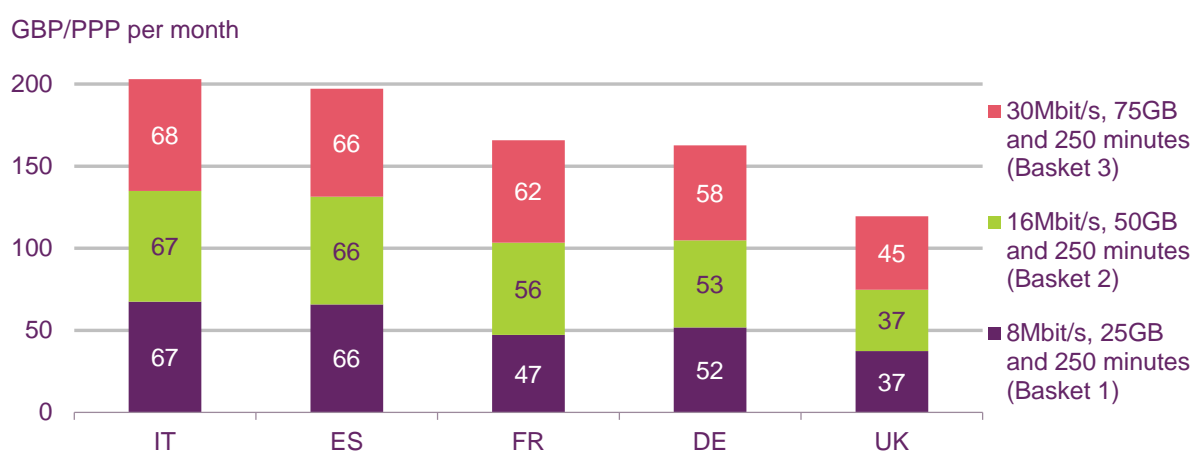
However, by defining the price of our baskets in different ways, as set out above, we have mitigated the risk that the analysis in the Scorecard distorts the actual prices consumers can expect to pay. We also believe that our data are the most reliable available that compare fixed and mobile broadband prices across the EU5. We therefore consider that this is the most appropriate dataset for inclusion in the Scorecard.

‘Weighted average’ single-service pricing

The average of the lowest available prices for stand-alone fixed broadband and fixed voice services, weighted by the relevant provider’s market share, was cheaper in the UK than in any other EU5 country for all baskets in 2015.

The weighted average monthly price of single-service tariffs for Basket 1, offering 8Mbit/s headline download speed, 25GB of data use and 250 voice minutes, was £37 in the UK in 2015. For Basket 2 (16Mbit/s, 50GB and 250 minutes) the weighted average stand-alone price was also £37 in 2015, while that of Basket 3 (30Mbit/s, 75GB and 250 minutes) was £45. The highest weighted average stand-alone prices for all baskets were found in Italy in 2015.

Figure 15 Weighted average stand-alone pricing for fixed broadband and fixed voice services: July 2015



Source: Ofcom, using data supplied by Teligen.

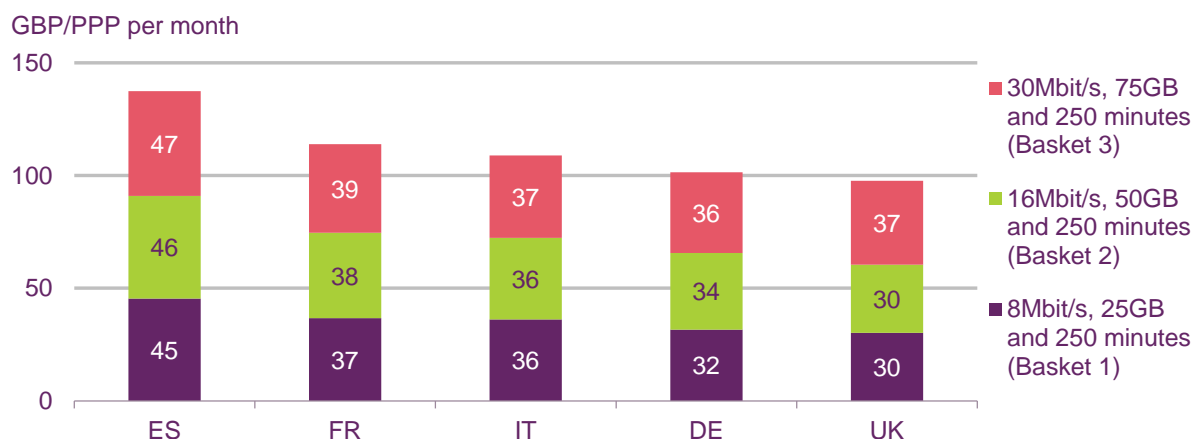
Note: (1) Average of three lowest single-service tariffs available in each country, weighted by market share. (2) Data refer to July 2015. (3) In some cases the weighted average price for a broadband connection is lower than it is for slower connection speeds. This is a result of the market share weighting for each speed, i.e. cheaper providers have greater market share at the faster connection speeds than they do at the lower speed. (4) PPP adjusted.

‘Weighted average’ bundle pricing

The UK offered the joint-lowest available weighted average bundled price for two baskets (Baskets 1 and 2) and the third-lowest average prices for one basket (Basket 3), after Germany and Italy, in 2015.

The lowest weighted average price for Basket 1 (which includes a broadband connection of at least 8Mbit/s, 25GB of data and 250 minutes of fixed voice calls) was found in the UK at £30 per month. The UK also offered the lowest average price for Basket 2 (16 Mbit/s, 50GB and 250 minutes) in 2015, at £30 per month, while the lowest average price for Basket 3 (30Mbit/s, 75GB and 250 minutes), was found in Germany in 2015, at £36. This was closely followed by Italy and then the UK; the average price of these baskets in the two countries was £37 per month.

Figure 16 Weighted average bundle pricing for fixed broadband and fixed voice services: July 2015



Source: Ofcom, using data supplied by Teligen.

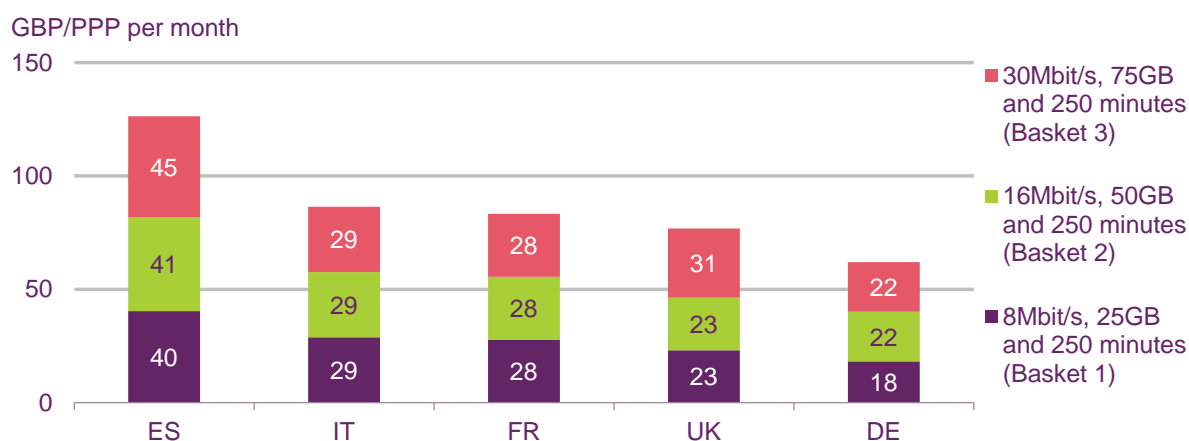
Note: (1) Average of the three lowest bundled tariffs available in each country. (2) Data refer to July 2015. (3) PPP adjusted.

‘Lowest available’ pricing

The ‘lowest available’ prices (including for bundled tariffs) of our three baskets of fixed broadband and fixed voice services give an indication of the lowest prices available in each country. On this measure the UK offered the second cheapest price in the EU5 for Baskets 1 and 2 and the fourth cheapest¹⁹ for Basket 3.

Germany offered the lowest-priced offer for all three baskets in 2015. The lowest possible price for Basket 1 (an 8Mbit/s headline download speed, 25GB of data use and 250 minutes package), was £18 per month in Germany, with the UK second-cheapest at £23 per month. The ‘lowest available’ prices for Basket 2 (a 16Mbit/s connection, 50GB data and 250 minutes) and for Basket 3 (30Mbit/s, 75GB and 250 minutes combination) in Germany were both £22 per month (the UK was also second-cheapest for Basket 2 at £23 per month). The UK was the second most expensive for Basket 3 at £31 per month; only Spain was more expensive, at £45 per month.

Figure 17 ‘Lowest available’ pricing for fixed broadband and fixed voice services, including bundled tariffs: July 2015



¹⁹ Includes the ‘true’ stand-alone Virgin Media fixed-line broadband service. There is no way to confirm whether other services are ‘true’ stand-alone or not.

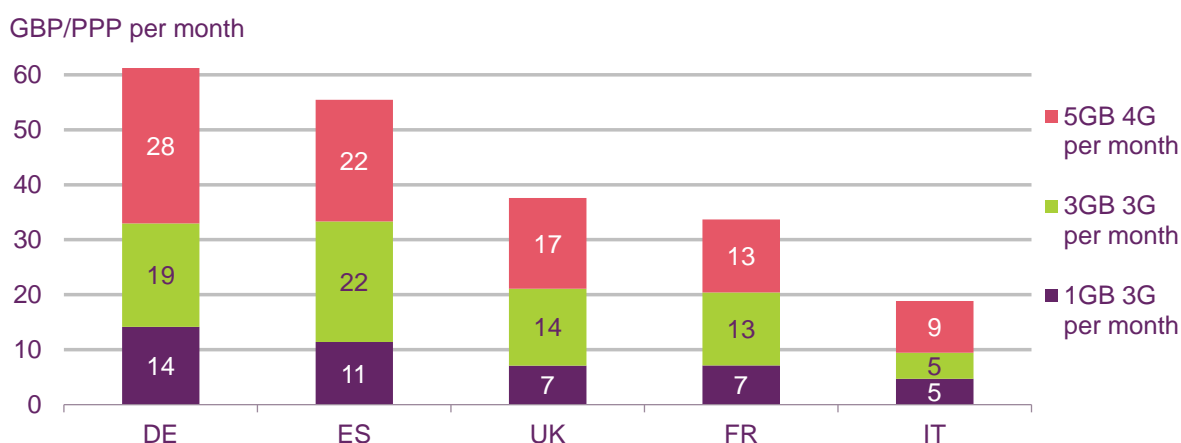
Source: Ofcom, using data supplied by Teligen.

Note: (1) Lowest tariff available in each country. (2) Data refer to July 2015. (3) PPP adjusted.

‘Lowest available’ mobile broadband pricing

The cheapest ‘lowest available’ prices for mobile broadband 3G connections offering 1GB and 3GB of data per month were in Italy, both at £5 per month. The cheapest ‘lowest available’ prices for mobile broadband 4G connections offering 5GB per month were also found in Italy (£9). UK operators offered the second-lowest prices for the 1GB per month data allowance (3G connections) (at £7), while the UK’s ‘lowest available’ pricing was third-lowest for the 3GB per-month data allowance (3G connections) and the 5GB per-month data allowance plans (4G connections), at £14 and £17 respectively.

Figure 18 ‘Lowest available’ mobile broadband pricing: July 2015



Source: Ofcom data supplied by Teligen.

Note: (1) Lowest tariff available from any of the largest providers by market share in each country. (2) Data refer to July 2015. (3) PPP adjusted.

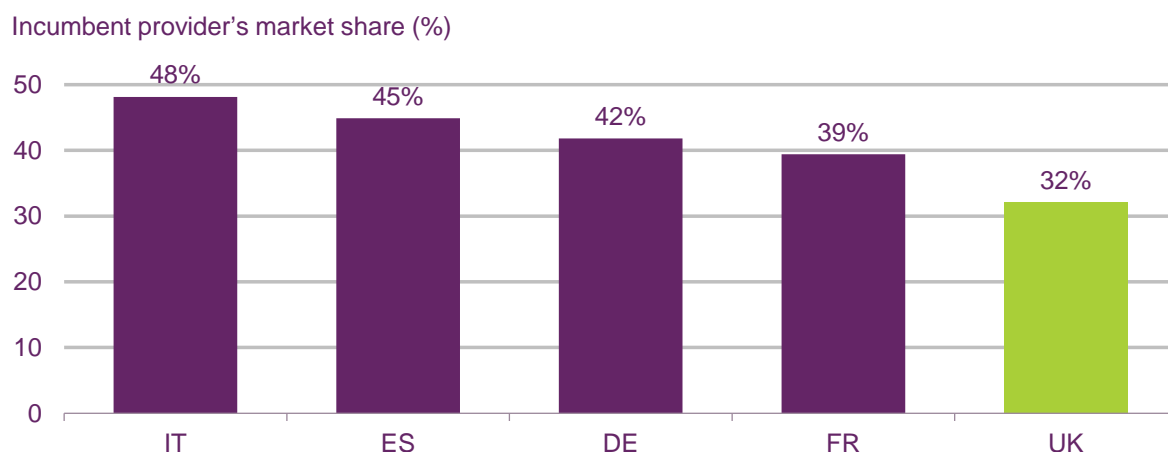
2.5 Choice

Market concentration in fixed broadband market

Figure 19 and Figure 20 illustrate two proxy measures of consumer choice in the broadband market: the percentage of all fixed broadband subscriptions that incumbent providers in EU5 countries operate, and the market share of the largest mobile network operator (MNO) in each country.

The incumbent fixed broadband provider in the UK, BT, operated a lower proportion of lines (32%) than the incumbent provider in any other EU5 market. The incumbent with the second-lowest market share was in France (at 39%). The incumbent operating the highest proportion of lines was in Italy (48%).

Figure 19 Percentage of fixed broadband lines operated by incumbent: year-end 2014



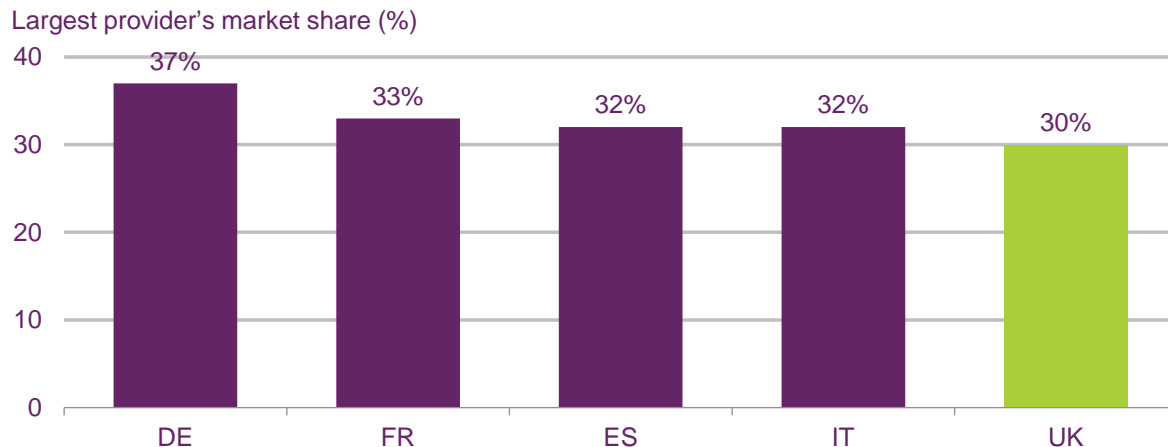
Source: EC, Digital Agenda Scoreboard 2015.

Note: (1) Data refer to year-end 2014. (2) These data refer to all forms of fixed-line broadband, including standard and ≥ 30 Mbit/s connections.

Market concentration in mobile connection market

The leading MNO in the UK held 30% of UK mobile connections in 2014. In Italy and Spain, the leading MNOs operated a slightly higher proportion of connections (32%). The market in France, at 33%, was more concentrated, and Germany had the most concentrated MNO market in 2014, with the leading MNO holding 37% of the market.

Figure 20 Percentage market share of leading MNOs: year-end 2014



Source: EC, Digital Agenda Scoreboard 2015, IHS.

Note: (1) Data refer to year-end 2014. (2) Some figures include MVNOs in the overall market share of the MNOs. These differences are due to varying methods of measurement. (3) UK and Germany figures provided by IHS. (4) Digital Agenda Scoreboard data are based on the number of active SIM cards, including both voice and data services, installed in telephones, modem, usb keys or other devices.

Annex A: EU28 data

1.1 Overview

The charts in this Annex illustrate the Scorecard's metrics using data on all EU28 countries, where these data are available. We include these charts for completeness. However, as explained above, we consider that it is more appropriate to compare the UK's broadband network against those of other major European economies, as we have done in the Scorecard, than against all EU countries.

The data below are from the same sources as those in the Scorecard except in the case of pricing, as Ofcom's pricing model incorporates tariffs only from EU5 countries. For the Scorecard published two years before this one, we used data comparing the EU28 countries, produced by Van Dijk Management Consultants for the EC. However, we are not aware of a similar study having been published since then, although there are similar reports planned. We have chosen to omit EU28 price comparisons from the Scorecard this year, and will re-evaluate this on an ongoing basis.

Figure 21 Overview of the UK's position on the Scorecard relative to the EU28

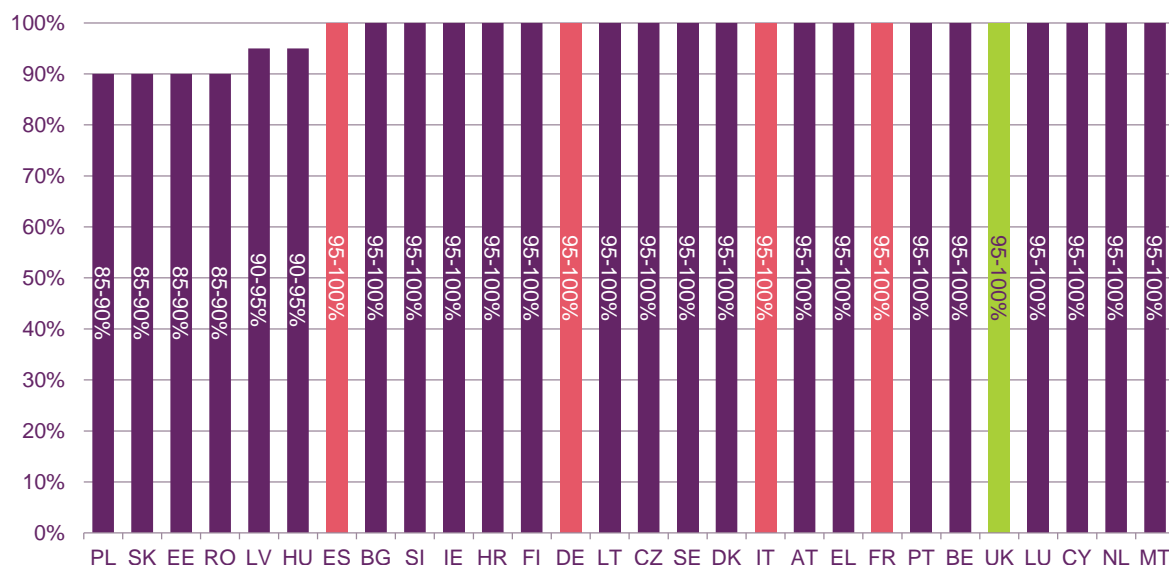
Coverage	EU28	Take-up and usage	EU28	Speed	EU28	Price	EU28	Choice	EU28
Standard broadband coverage	=1 /28	Standard broadband take-up	3 /28	Fixed download speed	N/A	Price of standard broadband	N/A**	Market concentration in fixed broadband market ***	5/ 27
Broadband coverage of NGA connections	9/ 28	Broadband take-up of connections with a headline speed ≥30Mbit/s	12/ 28	Fixed upload speed	N/A	Price of broadband connections with a headline speed ≥30Mbit/s	N/A**	Market concentration in mobile broadband market ****	2/ 25
HSPA 3G broadband coverage	=1 /28	Mobile broadband take-up	5/28	Mobile download speed	N/A	Price of mobile broadband	N/A**		
4G mobile broadband coverage	11 /27	% accessing internet regularly	5/28						
		% never used internet	6/28						
		% buying goods or services	1/28						
		% interacted with public authorities	15/ 28						

Source: Ofcom

Notes: 3/28 for broadband penetration per 100 households for the period relating to Q2 2015. The UK ranked 4/28 for broadband penetration per 100 people (year-end 2014). We consider the per household figure to be a more representative figure. **We derive the EU28 pricing data below from a different source to the EU5 pricing figures in the Scorecard, above. No update was available for this year. ***No data available for Finland. ****No data available for Belgium, Greece and the Netherlands.

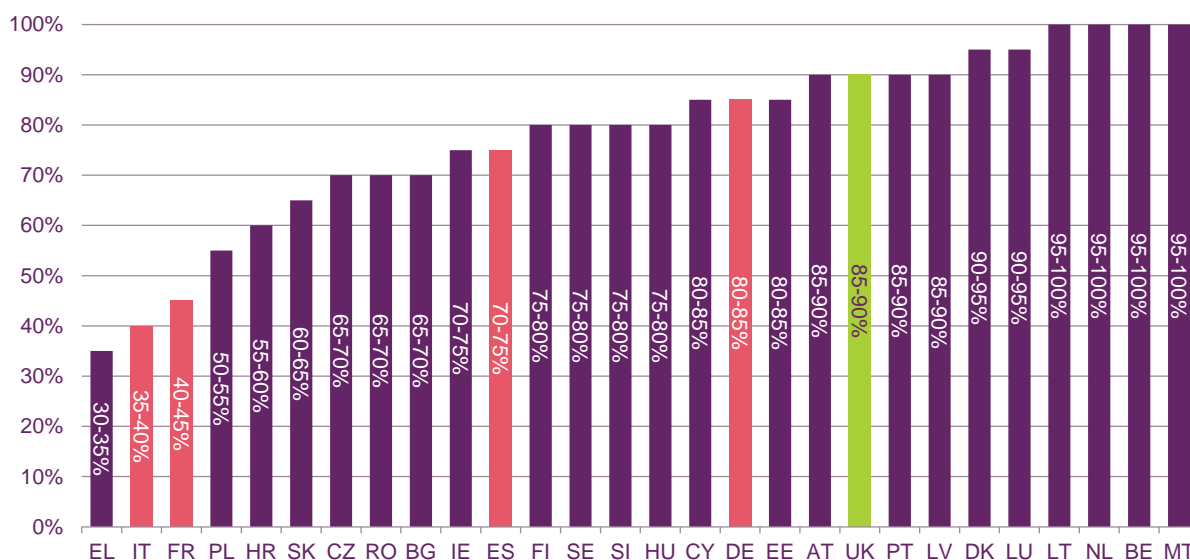
1.2 Coverage

Figure 22 Percentage of households in areas served by standard broadband: year-end 2014



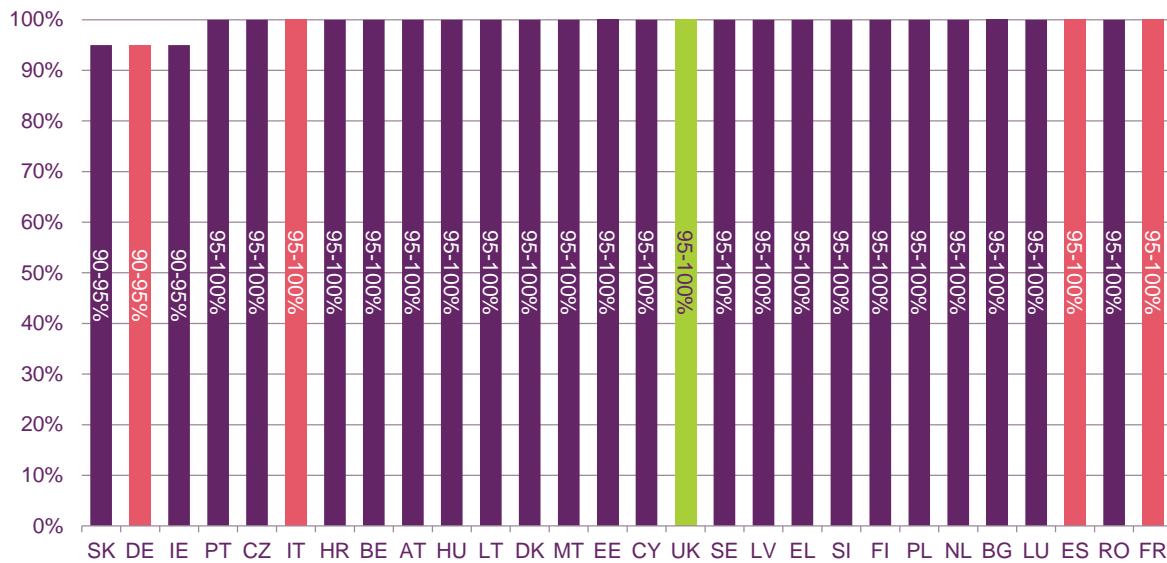
Source: EC, Digital Agenda Scoreboard 2015. Note: (1) Data refer to year-end 2014. (2) Ofcom has banded Point Topic's figures within a range between the nearest integers divisible by 5. (3) 'Standard broadband' refers to DSL, FTTP, WiMAX and Standard Cable, the main fixed line technologies capable of providing headline speed of at least 144kbit/s and less than 30Mbit/s download speed for end-users.

Figure 23 Percentage of households in areas served by NGA broadband: year-end 2014



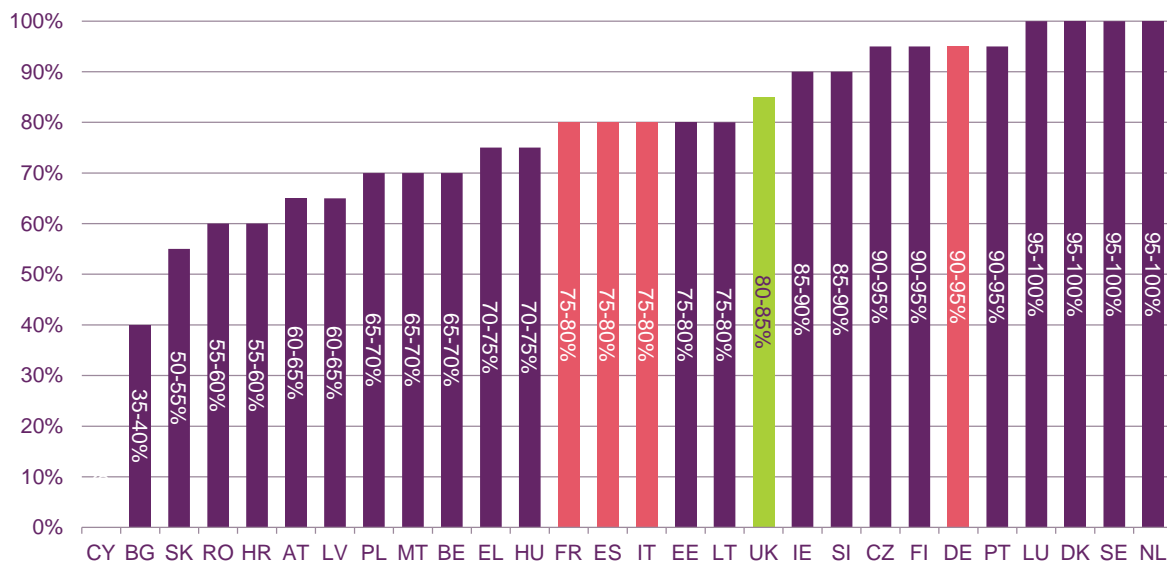
Source: EC, Digital Agenda Scoreboard 2015. Note: (1) Data refer to year-end 2014. (2) Ofcom has banded Point Topic's figures within a range between the nearest integers divisible by 5. (3) NGA broadband' refers to NGA technologies, including VDSL, FTTP and DOCSIS3.0 cable, those needed to provide 30Mbit/s download speeds for end-users.

Figure 24 Percentage of households in areas served by HSPA 3G broadband: year-end 2014



Source: EC, Digital Agenda Scoreboard 2015. Note: (1) Data refer to year-end 2014. (2) Ofcom has banded Point Topic's figures within a range between the nearest integers divisible by 5. (3) 'HSPA 3G mobile broadband' refers to coverage by at least one HSPA-upgraded 3G mobile network.

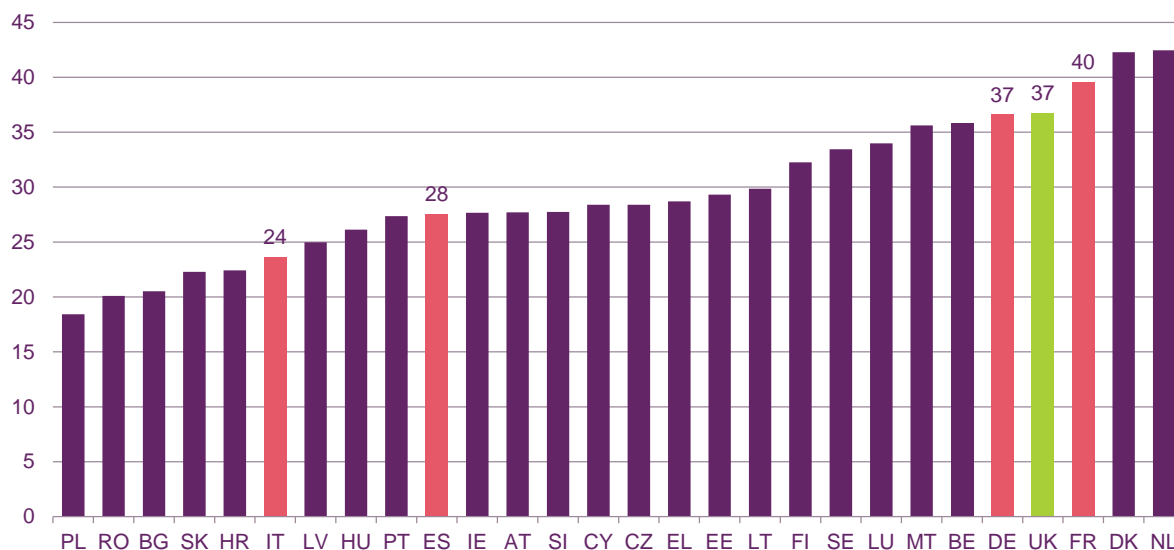
Figure 25 Percentage of households in areas served by 4G broadband: year-end 2014



Source: EC, Digital Agenda Scoreboard 2015. Note: (1) Data refer to year-end 2014. (2) Ofcom has banded figures within a range between the nearest integers divisible by 5. (4) '4G mobile broadband' refers to coverage by advanced fourth generation mobile broadband (LTE protocol).

1.3 Take-up and use

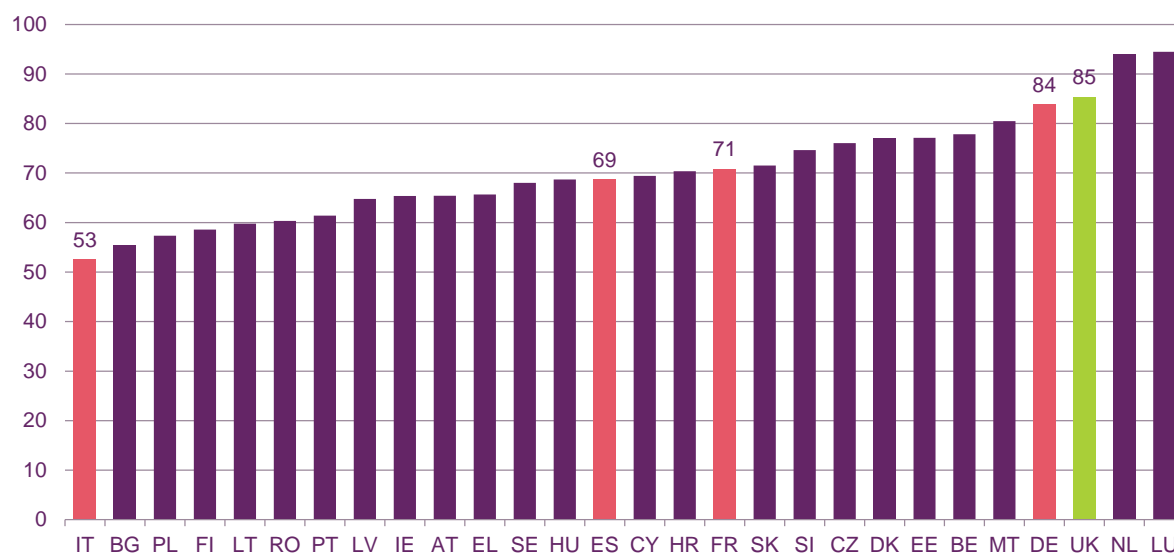
Figure 26 Fixed broadband connections per 100 people: year-end 2014



Source: EC, Digital Agenda Scoreboard 2015.

Note: (1) Data refer to year-end 2014. (2) These data refer to all forms of fixed-line broadband, including standard and 30+Mbit/s connections.

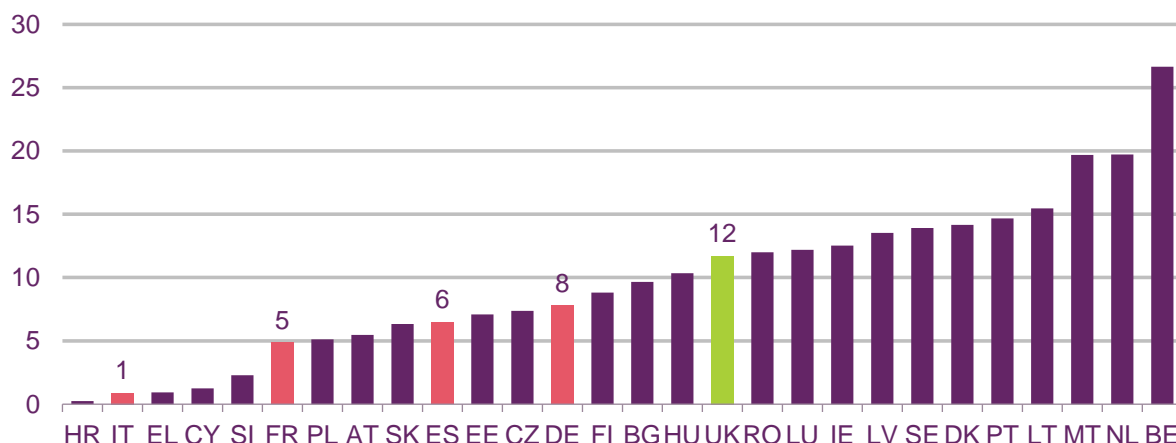
Figure 27 Fixed broadband connections per 100 households: Q2 2015 [Updated March 2016]



Source: Eurostat, Community survey on ICT usage in Households and by Individuals, 2015.

Note: (1) Data refer to Q2 2015. (2) These data refer to all forms of fixed line broadband, including standard and 30+Mbit/s connections. (3) Data relate to households with at least one member aged 16-74 years.

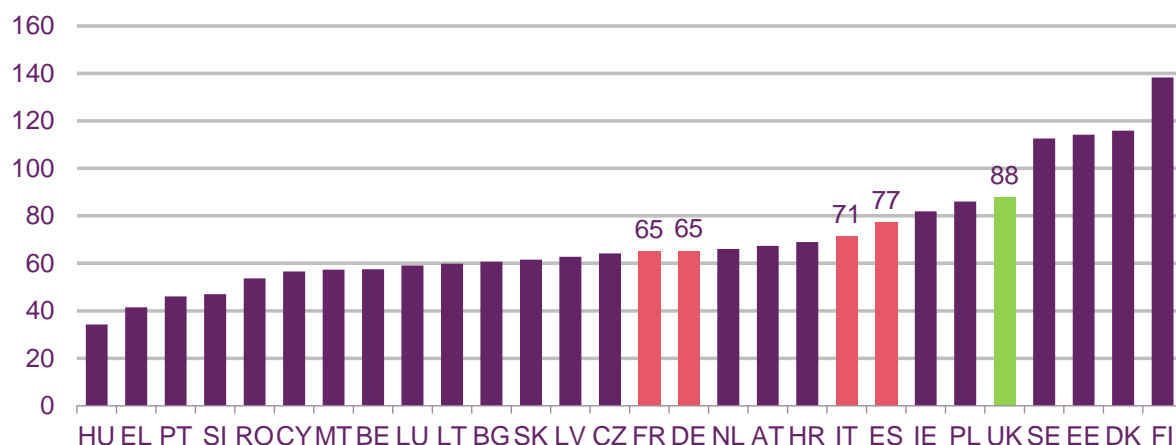
Figure 28 Broadband connections with a headline speed of 'more than or equal to' 30Mbit/s per 100 people: year-end 2014



Source: EC, Digital Agenda Scoreboard 2015.

Note: (1) Data refer to year-end 2014. (2) '30+Mbit/s broadband' refers to NGA technologies, including VDSL, FTTP and DOCSIS3.0 cable, those needed to provide 30Mbit/s download speeds for end-users.

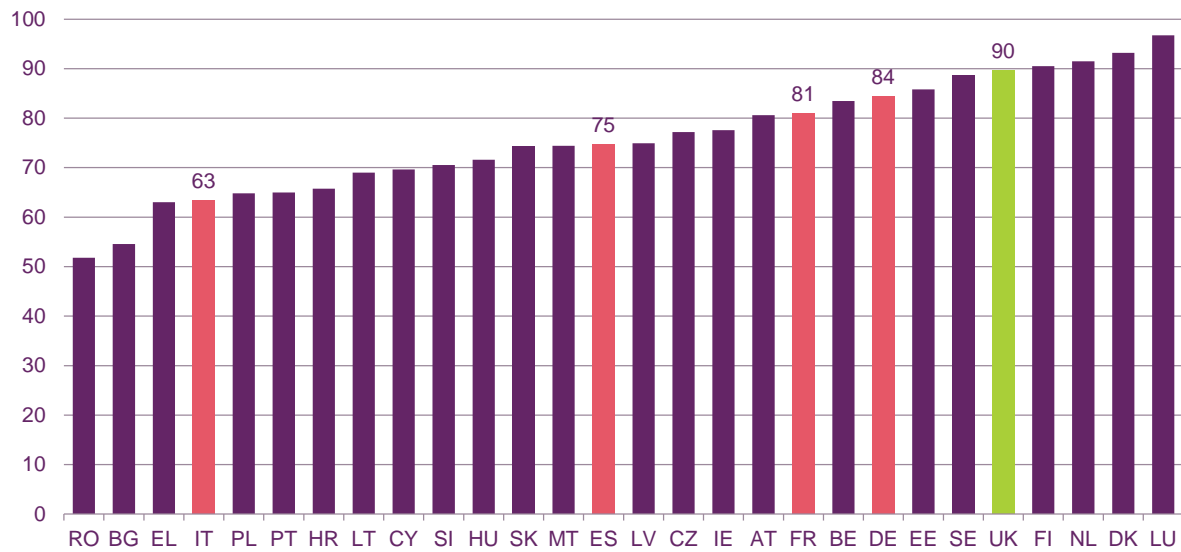
Figure 29 Mobile broadband connections per 100 people: year-end 2014



Source: EC, Digital Agenda Scoreboard 2015.

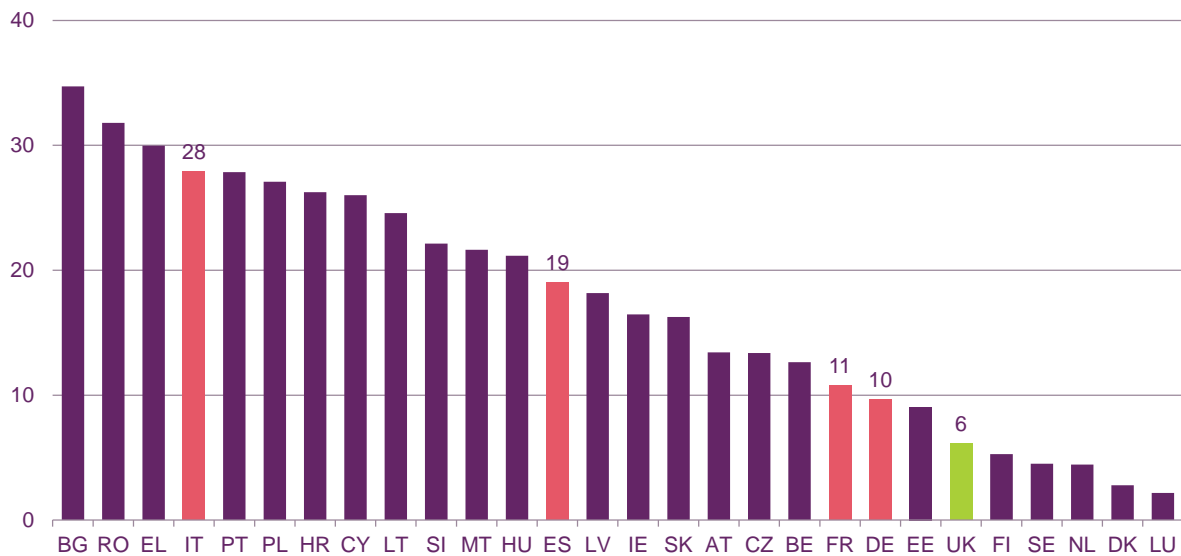
Notes: (1) Data refer to year-end 2014. (2) Data combine the number of subscriptions that have connected to the internet in the preceding 90 days through a standard mobile subscription, the number of subscriptions to dedicated data services over a mobile network that are purchased separately from voice services as a stand-alone service (modem/dongle), and the number of subscriptions to dedicated data services over a mobile network that are purchased separately from voice services as an add-on data package requiring an additional subscription. (3) Mobile broadband connections may use technologies including 3G, HSPA and LTE.

Figure 30 Percentage of individuals accessing the internet at least once a week: Q2 2015 [Updated March 2016]



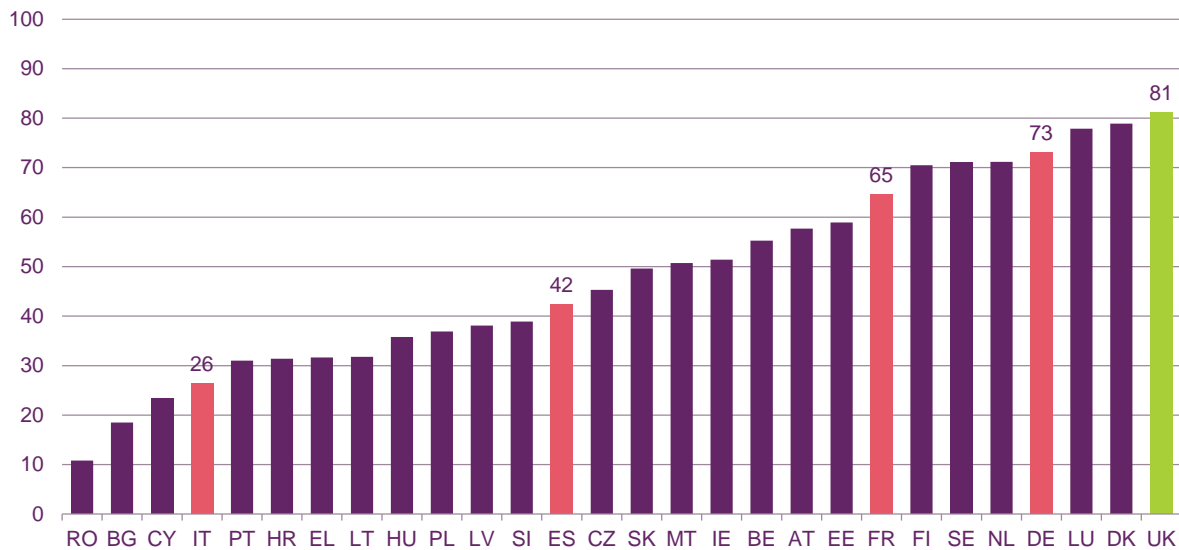
Source: Eurostat, Community survey on ICT usage in Households and by Individuals, 2015. Note: (1) Data refer to Q2 2015. (2) These data cover individuals aged 16 to 74.

Figure 31 Percentage of individuals who have never used the internet: Q2 2015 [Updated March 2016]



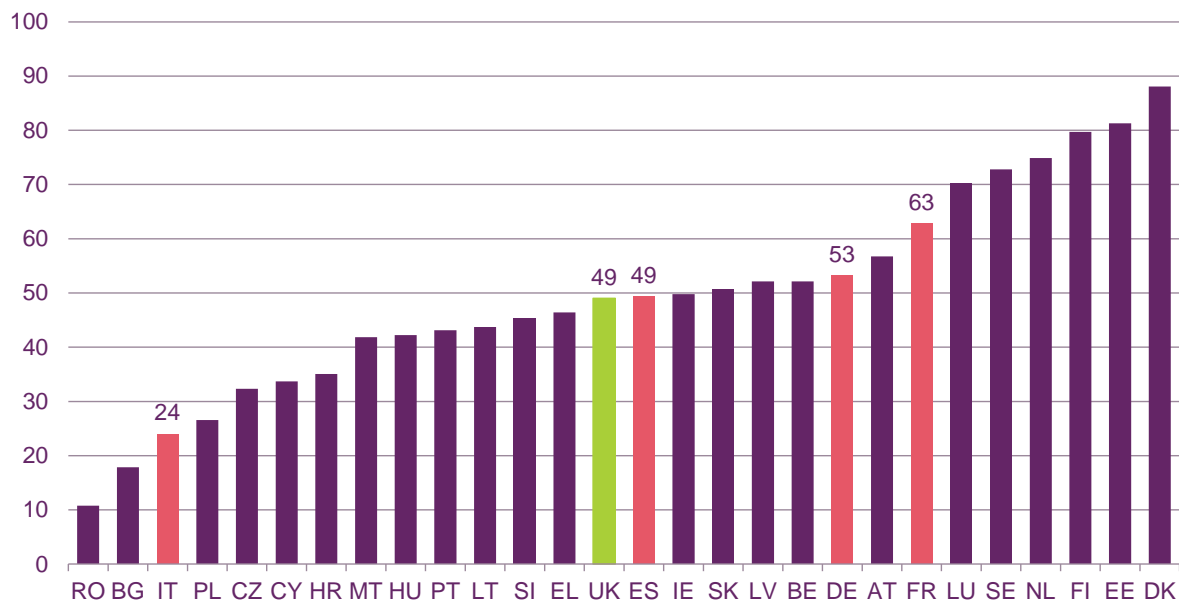
Source: Eurostat, Community survey on ICT usage in Households and by Individuals, 2015. Note: (1) Data refer to Q2 2015. (2) These data cover individuals aged 16 to 74.

Figure 32 Percentage of individuals who have bought or ordered goods or services online in the past 12 months: Q2 2015 [Updated March 2016]



Source: Eurostat, Community survey on ICT usage in Households and by Individuals, 2015. Note: (1) Data refer to Q2 2015. (2) These data cover individuals aged 16 to 74.

Figure 33 Percentage of population who have interacted online with public authorities in the past 12 months: Q2 2015 [Updated March 2016]



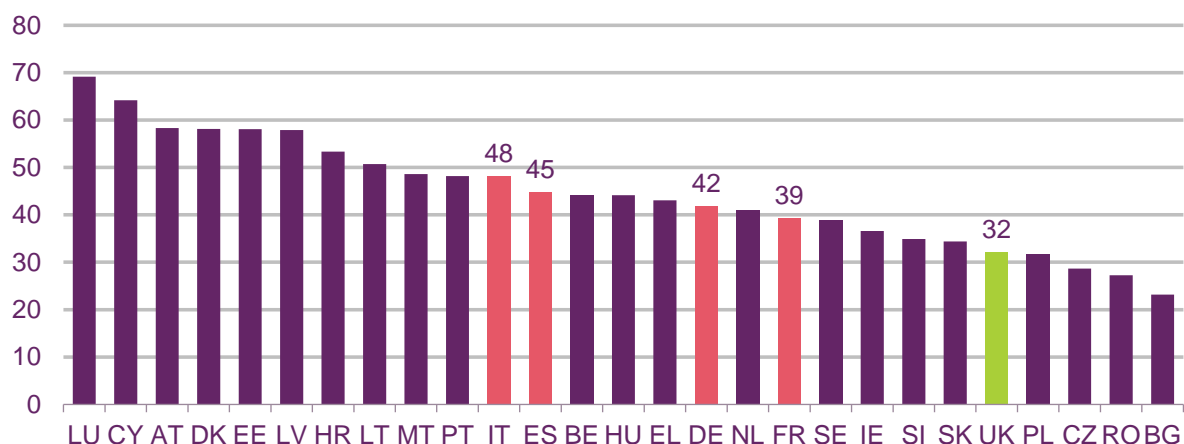
Source: Eurostat, Community survey on ICT usage in Households and by Individuals, 2015. Note: (1) Data refer to Q2 2015. (2) These data cover individuals aged 16 to 74.

1.4 Price

We have included analysis from our Teligen model in the Scorecard because it uses the most recent pricing data available for the EU5; however, it does not include tariffs from all EU28 countries.

1.5 Choice

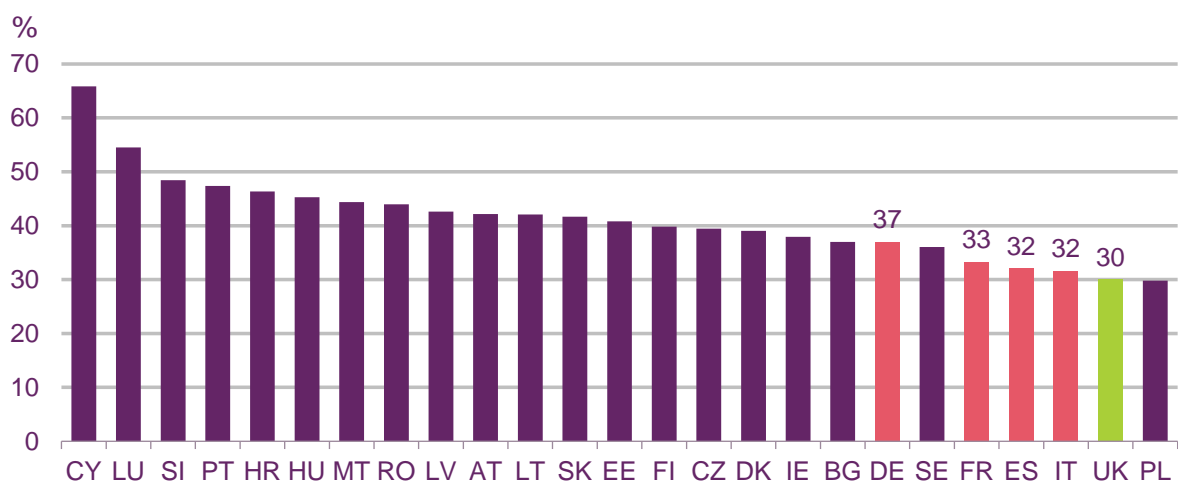
Figure 34 Percentage of fixed broadband lines operated by incumbent: year-end 2014



Source: EC, Digital Agenda Scoreboard 2015.

Note: (1) Data refer to year-end 2014. (2) These data refer to all forms of fixed line broadband, including standard and 30+Mbit/s connections. (3) No data available for Finland.

Figure 35 Percentage market shares of leading MNOs: year-end 2014



Source: EC, Digital Agenda Scoreboard 2015, IHS.

Notes: (1) Data refer to year-end 2014. (2) Some figures include MVNOs in the overall market share of the MNOs. These differences are due to varying methods of measurement. (3) UK and Germany figures provided by IHS. (4) Digital Agenda Scoreboard data are based on the number of active SIM cards, including both voice and data services, installed in telephones, modem, usb keys or other devices.

Annex B: Challenges of providing data

Due to the complexity of gathering data across comparator countries, we face a number of practical considerations in compiling the Scorecard. These relate to ensuring that the data we publish are comparable, reliable and the most recent available at the time of preparing the Scorecard. We have applied the same considerations for this edition of the Scorecard as we did for last year's report.

Comparable: The notes to the charts in the Scorecard contain the definitions of 'standard' fixed-line broadband, 'superfast product' broadband and mobile broadband that Ofcom or other organisations used in collecting the relevant data. In some cases these vary across different charts and countries. But in general, 'standard' fixed-line broadband includes technologies capable of providing speeds over 144Kbit/s and less than 30Mbit/s, while fixed-line 'superfast product' broadband is made up of technologies capable of providing speeds equal to or greater than 30Mbit/s, made up of NGA technologies. We take these definitions of broadband from those that the European Commission (EC) uses in collecting data to measure progress against its Digital Agenda targets.²⁰

In the interests of transparency, the Scorecard shows publicly-available data (with the exception of pricing data, explained below). We publish the source of the data in the notes to the charts.

As one of the aims of the methodology used to compile these data was to ensure consistency across the EU28 to enable comparison between countries, the figures we publish here may differ from those that Ofcom or other organisations publish elsewhere, which may have been collected and analysed for a different purpose or using a different methodology.

One example of this difference is the Scorecard comparisons of 'take-up and use' across the EU5. In general, we consider household penetration a more useful measure of take-up among the population than population penetration. We therefore use one measure, based on survey data that excludes business connections, to illustrate fixed broadband penetration per 100 households (Figure 8). However, we also present fixed broadband connections per 100 people (Figure 7), a measure of fixed broadband penetration based on industry data rather than survey data. This is for reasons of consistency and to enable cross-comparison with measures of 'superfast product' broadband, and mobile broadband, which use the same survey methodology.

The metrics in Figure 1 are useful indicators of how broadband networks compare across the EU at a given point in time. However, they are just that; given the diverse topography, population density and legacy infrastructure of EU states (to name just a few factors), the direct comparison of individual metrics does not take account of the dynamics and relative challenges of deploying broadband networks in different countries.

Reliable: Where we have made any comments about the basis on which we, or our sources, collected or analysed the data in the Scorecard; we have noted these in the charts accompanying the commentary.

At the time of publication of the first three Scorecards we did not consider that there were suitable data available to illustrate three of the metrics in Figure 1. These were: fixed-line

²⁰ EC, *Digital Agenda Scoreboard*, 2015 <https://ec.europa.eu/digital-agenda/en/scoreboard>.

download speed, fixed-line upload speed and mobile download speed. Similarly, this year, we have not been able to identify suitable datasets for inclusion in this Scorecard.

Since the first Scorecard was published the Commission has published three research documents on the quality of broadband services in the EU.^{21 22 23} After publishing the second report, it sought views and data from the Body of European Regulators for Electronic Communications (BEREC) in order to refine its methodology regarding data collection and normalisation, to improve the accuracy of the report. However, the data received from NRAs was still not sufficient to enable the results to be weighted to the same extent as Ofcom's UK SamKnows data. Other fixed-line download speed datasets are publicly available, but in our opinion there are limitations in the methodology used to obtain these datasets, which mean that they may not offer comparable, robust estimates of national average fixed-line download speed. For this reason we have not included the data in this Scorecard. We discuss the availability of broadband speed data further in Annex B.

Most recent available: Collecting data across different countries can often take a long time. This means that some of our datasets may have been collected many months before the Scorecard's publication. Given the speed at which broadband markets are moving, comparable and robust data covering the EU5 may not reflect the state of individual markets at the time of this Scorecard's publication, and more up-to-date information for each country may be available elsewhere. The notes to each chart set out the date to when its data refer.

The EC data are drawn from two main datasets,²⁴ the comprehensive database from Eurostat²⁵, which refers to households within Europe, and the Digital Agenda data tool²⁶ available on the Digital Agenda website. The most recent Digital Agenda Scoreboard data refers to year-end 2014, while the most recent Eurostat data, included in this update of the Scorecard, refers to Q2 2015.

²¹ *Quality of Broadband Services in the EU*, March 2012, <https://ec.europa.eu/digital-agenda/en/news/quality-broadband-services-eu-march-2012>

²² *Quality of Broadband Services in the EU*, October 2013
https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=4996

²³ *Quality of Broadband Services in the EU*, October 2014, <https://ec.europa.eu/digital-agenda/en/news/quality-broadband-services-eu>

²⁴ See <http://ec.europa.eu/digital-agenda/download-data>

²⁵ Eurostat, *Information Society, Comprehensive Database*
<http://ec.europa.eu/eurostat/web/information-society/data/comprehensive-database>

²⁶ See EC, *Digital Agenda Scoreboard 2015*, <http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard>

Annex C: Analysis of broadband speed data

To estimate the UK's national average broadband speed with appropriate accuracy, Ofcom tests a carefully-controlled sample of consumers' fixed broadband connections using hardware installed in their homes.

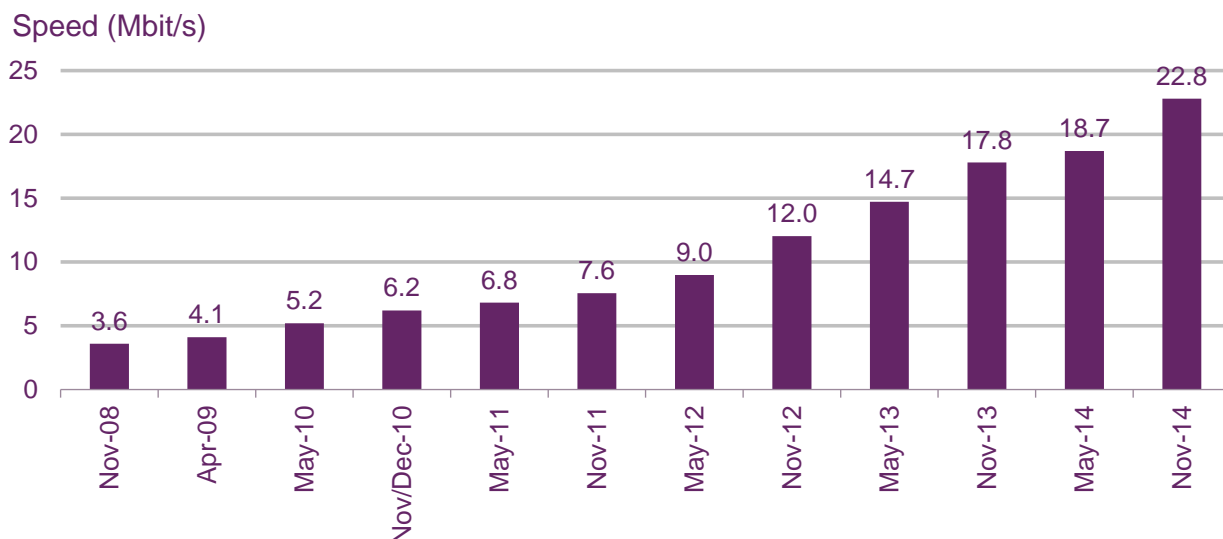
Ofcom has measured the broadband speeds that consumers receive in the UK since 2008. Between 2008 and 2014 we published our results twice a year, including the average speed of broadband in the UK. We are now publishing our results on an annual basis. Broadband speed analysts, SamKnows, currently collects these data on our behalf. Our most recent published figure for the average speed of broadband in the UK is 22.8Mbit/s, which was derived from data collected in November 2014.

SamKnows obtains the data using test equipment called 'white boxes' installed in homes. These are connected to the customer's modem or router and run tests to measure the speed of the broadband line.

As we know how the boxes are distributed, their location, the package to which the home subscribes and how and when the tests take place, we are confident that our data generate a reliable estimate of the average UK broadband speed that consumers experience.

The chart below shows the average UK fixed broadband speed since November 2008.

Figure 36 Average fixed broadband download speed in the UK: 2008-2014



Source: SamKnows measurement data for all panel members

Notes: (1) Data have been weighted by ISP package and LLU/non-LLU connections, rural/urban, geographic market classification and distance from exchange to ensure that they are representative of UK residential broadband consumers as a whole. (2) As sufficient sample sizes were not available for consumers on packages of 'up to' 2Mbit/s or less, data collected for these packages in April 2009 has been factored in, in proportion to share of all connections in November 2014. (3) Data collected from single-thread download speed tests prior to November/December 2010 and multi-thread download speed tests for November/December 2010 onwards.

The EC commissioned research on European broadband speeds in the form of three annual reports; the third and final one of these was published in October 2015.²⁷ The reports are based on data collected for the Commission by SamKnows using the same broad approach as Ofcom uses for its broadband speeds work. The results of this work aim to cover all EU countries. BEREC shared with the Commission its concerns over some aspects of the methodology regarding data collection and normalisation in the second report.²⁸ NRAs provided the Commission with some data which somewhat improved the robustness of the third report, but not enough to enable it to be weighted to the same extent as Ofcom's UK SamKnows data. Given this, as well as the fact that it was the Commission's final report and this source will not be available in future years, we have decided not to include any results from this piece of research in our Scorecard.

1.1 Other ways to measure speed

There are other ways to measure the speed of broadband networks, and these have generated a number of fixed-line broadband speed datasets.²⁹ Drawing on our experience of collecting fixed-line speed data, we believe that there are limitations to the methodologies used to obtain these datasets, and consequently we cannot be confident that they offer estimates of national average speed based on comparable testing and samples across countries, or that they reflect the speeds that consumers experience in practice. For these reasons we have not included the data in this Scorecard. We examine these alternative methods and their limitations below.

Sync speed measurement. The sync speed is the maximum speed a broadband line can support, and is normally higher than the average speed consumers actually receive. As part of the process of collecting data for publication in Ofcom's *Connected Nations* Report, we survey a large majority of the broadband lines in the UK to obtain their sync speed from network providers.³⁰ This requires the largest communications providers in the country to provide data on every broadband line they operate. In our most recent analysis of data derived from this method, collected in June 2015, we calculated that the average UK fixed-line download speed was 28.3Mbit/s.

This approach provides an accurate measure of the consumer access network's performance. However, it does not take account of factors such as contention, traffic management policies or protocol overheads, so its results usually exceed the speed that consumers will experience in practice.

Software testing. These are tests of end-users' connections that do not require the installation of hardware on the user's premises. For example, users can test their connection speed using downloaded applications, the providers of which may collate results to estimate national average broadband speeds. Alternatively, some content providers estimate users' connection speed from the time taken to deliver content of a known size. Both methods of testing are inexpensive to perform and can generate data from a large number of consumers quite easily.

²⁷ EC, *Quality of Broadband Services in the EU*, <https://ec.europa.eu/digital-agenda/en/news/quality-broadband-services-eu>

²⁸ BEREC, *BEREC Statement on the second Broadband Quality of Service report prepared for the European Commission* http://berec.europa.eu/eng/document_register/subject_matter/berec/download/0/4344-berec-statement-on-the-second-broadband-0.pdf

²⁹ See for example www.speedtest.net and www.akamai.com

³⁰ See Ofcom, *Connected Nations 2015* <http://stakeholders.ofcom.org.uk/market-data-research/market-data/infrastructure/connected-nations-2015/>.

However, it is more difficult to control the environment in which software testing generates its results in comparison with equipment-based testing, for example:

- the use of an end user's broadband connection in a separate session during a test can affect its results;
- deriving speeds data from the time required to deliver small amounts of content may not take account of the effect of the start-up processes of network protocols;
- connection speed may not affect the time required to deliver data, if providers stream that data at a constant speed (typically the case with video);
- variation in the amounts of data that end-users consume in different countries, and their transit or peering arrangements can skew some software-based testing; and
- the use of WiFi to access broadband service can affect its speed, and levels of WiFi adoption may vary between countries.

Software testing can be a useful tool for consumers, and generates large amounts of international data. However, given the factors set out above, we do not consider these data suitable for deriving comparable national average fixed-line download speed estimates.

1.2 Publishing broadband speed data in the Scorecard

We will continue to review the availability of data relating to fixed-line download speed, fixed-line upload speed and mobile download speed, and will consider it for publication in future editions of the Scorecard.