

The International Communications Market 2016

3 Telecoms and networks

Contents

3.1 Telecoms: overview and key market developments	74
3.1.1 Overview	74
3.1.2 Broadband Scorecard	77
3.1.3 Availability and take-up of 4G services continue to grow	79
3.2 The telecoms industry	85
3.3 Fixed voice services	87
3.4 Mobile voice and messaging services	92
3.5 Broadband services	99
3.5.1 Coverage	99
3.5.2 Take-up and use	106
3.5.3 Choice	114

3.1 Telecoms: overview and key market developments

A note on the data presented in this chapter

The aim of the ICMR is to benchmark the UK communications sector against a range of comparator countries. In order to allow for international comparability, we have had to source and use the best metrics available. As a result, some of the metrics presented in this chapter differs from those presented in the *Connected Nations* 2016 report on several counts, such as time periods and definitions.

For example, the data used in the Telecoms chapter are for the year ended December 2015 while the data shown in *Connected Nations* 2016 report relate to June 2016. In terms of definitions, 3G and 4G mobile coverage in the ICMR represent outdoor population coverage from at least one operator. However, the *Connected Nations* report focuses on the percentage of premises that have indoor coverage from all four operators, as well as geographic coverage from all four operators. In the case of mobile coverage, there is no international industry standard and available figures used in the ICMR tend to be based on total outdoor coverage.

3.1.1 Overview

Mobile services made up the greatest proportion of telecoms revenues in most of our comparator countries

Total retail telecoms revenues across our comparator countries were £597bn in 2015, with mobile voice and mobile data services contributing almost two-thirds (64%) of this total. Mobile services made up the greatest proportion of telecoms revenues in most of our comparator countries.

The UK had the highest number of fixed voice connections per 100 people, of all comparator countries

The UK had 62 fixed voice connections per 100 people (including managed VoIP) in 2015, up one connection since 2014. The UK was one of only three comparator countries where fixed voice take-up increased.

The proportion of total fixed voice connections that were managed VoIP increased in all comparator countries

In the UK, managed VoIP connections made up only 16.2% of the total, ranking the UK twelfth among the comparator countries. However, the UK proportion had increased, by 1.7pp, since 2014.

The UK had the second highest average number of monthly fixed voice call minutes per person

In all our comparator countries, the average monthly fixed voice call minutes per person declined in 2015. The UK ranked second among our comparator countries, at 122 minutes per person per month, down 12 minutes per month (8.8%) since 2014.

The UK had the highest average per-capita revenue for fixed voice services

The highest average revenue for fixed voice services (including managed VoIP services) was generated in the UK in 2015, at £11.58 per person per month. It was lowest in China, India and Nigeria, at less than £1 per person in all three countries.

Household penetration of fixed broadband reached 80% in the UK

The household penetration of fixed broadband increased across most of our comparator countries in 2015. In the UK, it reached 80% by end of 2015, an increase of 3 percentage points since 2014, putting the UK fifth among our comparator countries.

Fixed data traffic volumes grew in most of our comparator countries

With the increasing use of high-speed fixed broadband services, fixed data traffic volumes grew in most of our comparator countries in 2015, pushing down the price per unit of fixed broadband data across most markets. However, there were some countries where the prices increased as more consumers migrated to superfast services, which tend to be more expensive than standard broadband. In the UK, fixed data volumes per head reached 27GB per month as the price declined by 7%, to £0.26 per GB in 2015.

Seventy-two per cent of respondents in the UK were satisfied with the reliability of their household fixed broadband services

Overall satisfaction with fixed broadband services was 70% or higher in five out of nine of the comparator countries in which our consumer research took place, with the UK at 76%. The UK ranked highest, along with the US, on satisfaction with the reliability of household fixed broadband services.

The majority of our comparator countries had more mobile connections than people

In the majority of our comparator countries, the number of mobile connections per 100 people was up in 2015; it ranged from 77 in India to 175 in Russia. The UK was ninth of 18 comparator countries, with 131 mobile connections per 100 people.

Most comparator countries saw an increase in the number of average mobile call minutes per person

In the UK, average use increased by 3.3% to 184 minutes per person in 2015, putting the UK ninth among the comparator countries.

The average number of monthly mobile messages per person decreased in most of our comparator countries

This is mainly due to increasing smartphone take-up, as these devices enable consumers to access alternative text-based services, such as email and instant messaging. The UK had the third highest average mobile messaging use among the comparator countries, with 131 messages per person per month.

Eighty-five per cent of respondents in the UK indicated that they were satisfied with their overall mobile service

Overall satisfaction with mobile services was 80% or higher in five out of nine of the comparator countries in which our consumer research took place, with the UK at 85%.

Mobile data consumption increased in all comparator countries

In 2015, mobile data volumes per capita per month increased in all our comparator countries. In the UK, mobile data consumption reached 1.2GB per head per month, with 4G data accounting for over 85% of total volumes, while the price per unit declined by 33% to £6.68, partly because bundled data allowances continued to increase.

Figure 3.1 Key metrics: 2015

	UK	FRA	GER	ITA	USA	JPN	AUS	ESP	NED	SWE	POL	SGP	KOR	BRA	RUS	IND	CHN	NGA
Telecoms service revenues (£bn)	29	16	23	14	186	70	15	14	6	4	6	3	20	24	14	18	130	6
Monthly telecoms revenues per capita (£)	38	21	23	19	48	46	51	26	31	34	12	49	34	10	8	1	8	3
Total fixed voice revenues, incl. managed VoIP (£bn)	9	4	6	4	23	12	3	3	1	1	1	0.5	2	7	4	2	5	0.02
Fixed voice connections per 100 population (incl. managed VoIP)	62	60	46	38	38	44	38	41	41	36	15	36	51	21	25	2	18	0.1
Managed VoIP connections as % of total fixed voice connections	16	67	58	15	49	54	11	31	80	52	27	32	38	17	8	0.4	6	n/a
Monthly outbound fixed voice call minutes per capita (mins)	122	109	144	68	99	77	101	68	78	85	20	73	92	62	76	4	7	0.1
Total fixed broadband revenues (£bn)	5	2	3	2	38	17	5	3	1	1	1	1	5	6	2	1	40	0.004
Average monthly fixed data volumes per capita (GB)	27	15	12	8	22	38	15	11	19	35	5	21	50	3	5	0.2	4	0.001
Superfast fixed broadband coverage (% of households)	88	41	77	44	88	98	31	77	98	78	53	99	100	54	67	4	48	1
Total mobile revenues (£bn)	15	10	14	9	126	41	7	9	4	2	4	2	13	11	8	15	85	6
Mobile connections per 100 population	131	128	141	155	117	138	130	118	139	164	147	167	117	124	175	77	98	83
Monthly outbound mobile voice call minutes per capita	184	197	118	236	367	159	170	148	138	255	199	220	207	170	321	141	173	70
Mobile broadband connections per 100 people (4G/3G)	110	75	105	108	103	138	125	107	94	126	118	146	117	84	36	11	57	34
Average monthly mobile data volumes per capita (GB)	1.2	0.8	0.6	1.1	2.6	2.4	1.6	0.7	0.6	4.2	1.2	1.9	3.0	0.3	0.3	0.0	0.2	0.1
4G mobile network availability (% of population coverage of at least one operator)	93	80	95	91	98	99	89	81	100	99	100	100	100	48	59	6	87	14
4G as % of all mobile connections	36	27	20	17	50	49	54	26	31	39	14	44	71	10	9	0.2	29	1
4G as % of total mobile data use	85	65	70	47	82	82	75	67	57	57	54	67	97	50	55	8	61	2

Source: IHS / industry data / Ofcom

Note: For the purposes of this table most of the figures have been rounded to the nearest whole number. The superfast fixed broadband coverage in this table differs from the 89% premise coverage for speeds of 'up to' 30Mbit/s or more and 90% for speeds of 'up to' 24Mbit/s or more stated in our Connected Nations 2016 report, which were calculated based on detailed premises-level data inputs provided by UK communications providers and relate to June 2016.

3.1.2 Broadband Scorecard

We have benchmarked the UK against 18 other European and global peers using a number of broadband metrics, as summarised in Figure 3.2.⁷⁹ Our key findings include:

- ADSL fixed broadband services are widely available in most of our comparator countries. Eight countries, including the UK, had ADSL coverage of 99% or more households by the end of 2015, while Nigeria was the only country where ADSL-based services were available to less than half of households.
- Standard fixed broadband services offering advertised speeds of ‘up to’ 10Mbit/s or more were available to 95% or more of households in eight of our comparator countries, including the UK (97%), at the end of 2015. Singapore, South Korea and Japan had the highest availability of these services.
- The UK compared favourably to most of the comparator countries in terms of the availability of superfast broadband products (those with advertised speeds of ‘up to’ 30Mbit/s) ranking seventh at 88% of households. South Korea had the highest household superfast product availability at almost 100%, while the Netherlands was highest among our European comparator countries, at 98%.
- The UK performed well on the availability of fibre broadband (FTTx) networks; 84% of households were in areas served by fibre, ranking fifth after the Netherlands, South Korea, Singapore and Japan. South Korea, Japan and Singapore typically tend to lead on deployment of new infrastructure, and rank highly on many metrics.
- The UK, however, is notable for its limited availability of ‘full fibre’ fibre-to-the-building/fibre-to-the-home (FTTB/H) services, which can offer download speeds of 1Gbit/s or more. These services were available to just over 1% of UK households at the end of 2015, ranking the UK 17th out of 19 countries. In countries such as South Korea, Singapore and Japan, ‘full fibre’ services were available to more than 95% of homes.
- The comparatively low availability of ‘full fibre’ services in the UK is partly a result of BT’s decision to use VDSL for the last-mile connectivity of most of its fibre broadband network, and the UK’s lowest rank (18th) was for the proportion of fixed broadband connections that were ‘full fibre’. Japan ranked first on the proportion of ‘full fibre’ broadband connections (73%) followed by South Korea (71%) and Singapore (60%).
- The proportion of superfast broadband connections with an advertised speed of ‘up to’ 30Mbit/s or higher increased in all of our comparator countries. In seven comparator countries, more than half of fixed broadband connections were superfast at the end of 2015. In the UK, this proportion was 40%, ranking ninth among our 19 countries. The UK ranked better on connections with advertised speeds ≥ 30 Mbit/s and < 100 Mbit/s (fifth, at 32%), than on those with advertised speeds ≥ 100 Mbit/s where it was 11th with 7%.⁸⁰
- Eleven comparator countries had 4G mobile population coverage of 90% or more at the end of 2015, while six had 99% or higher coverage. The UK ranked tenth on availability of 4G networks (93%),⁸¹ an increase of 9pp since the end of 2014.

⁷⁹ The EU5 and EU28 scorecards are provided as appendices to this report. Both can be found at: <https://www.ofcom.org.uk/research-and-data/broadband-research/eu-broadband-scorecard>

⁸⁰ The UK ranks 17/19 on household coverage of ultrafast fixed broadband with advertised speeds of 300Mbit/s or higher (2%) based on figures provided by Analysys Mason as of September 2016.

⁸¹ This represents outdoor population coverage from at least one operator. This differs from the 4G (figure of 72.2%) and 3G (78.1%) coverage stated in our *Connected Nations* 2016 report, which focuses on the percentage of premises that have indoor coverage from all operators.

Figure 3.2 Broadband Scorecard: UK's position relative to 18 other comparator countries: 2015

	UK RANKING																			Lead Country	
	LOWEST										HIGHEST										
COVERAGE (HOUSEHOLDS)	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1		
ADSL																				99.9%	100%
CABLE																				47%	99%
FTTx																				84%	100%
VDSL																				83%	95%
FTTB/H				1%																	99%
Advertised speed >=10Mbit/s																				97%	100%
Advertised speed >=30Mbit/s																				88%	100%
Advertised speed >=100Mbit/s																				48%	100%
3G mobile																				99.0%	100%
4G mobile																				93%	100%
CONNECTIONS	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Lead Country	
ADSL																				59%	90%
CABLE																				19%	57%
FTTx																				22%	73%
FTTB/H				0.3%																	73%
>=10Mbit/s and <30Mbit/s																				53%	79%
>=30Mbit/s																				40%	92%
>=30Mbit/s and <100Mbit/s																				32%	49%
>=100Mbit/s																				7%	66%
3G mobile																				48%	66%
4G mobile																				36%	71%
USAGE	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Lead Country	
Fixed data per capita per month																				27GB	50 GB
Mobile data per capita per month																				1.2GB	4.2 GB

Source: IHS

Notes:

1. For the purposes of this table most of the figures have been rounded to the nearest whole number.
2. Coverage and connections data are for the year-end 2015
3. Mobile broadband includes all data connections made via 3G or 4G cellular networks, including those made via mobile handsets and using dedicated mobile data dongles and SIMs.
4. In order to provide a comparative benchmark across all 19 countries, 4G (93%) and 3G (99%) mobile coverage encompasses outdoor population coverage from at least one operator. This differs from the 4G (72.2%) and 3G (78.1%) coverage stated in our Connected Nations 2016 report, which focuses on the percentage of premises that have indoor coverage from all operators. The report can be found here: <https://www.ofcom.org.uk/research-and-data/infrastructure-research/connected-nations-2016>

3.1.3 Availability and take-up of 4G services continue to grow

4th generation (4G) mobile communications standard

4G stands for 4th generation, and describes the 4th generation mobile communications standard, which allows internet access at higher speeds than previous standards. All premium smartphones can use 4G services while still being compatible with the previous standards, 2G and 3G.

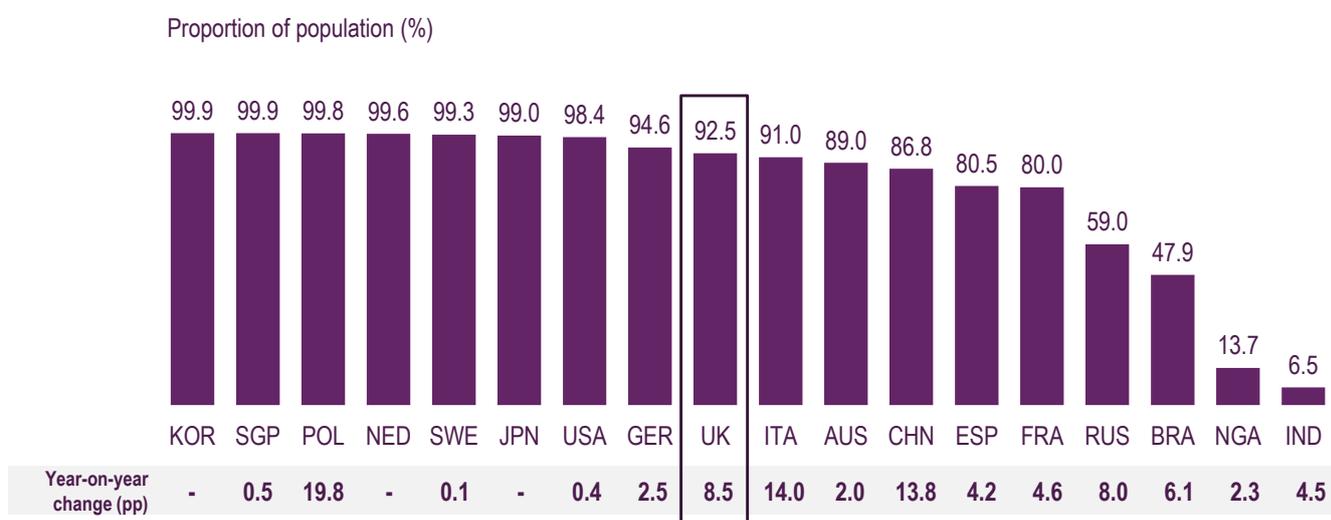
The first commercial 4G service in the UK was launched in October 2012 by EE after it was granted a licence modification allowing it to use its existing 1800MHz spectrum for 4G. The auction for 4G spectrum concluded in February 2013, with EE, Telefonica (O2), Vodafone, Three and Niche Spectrum Ventures Ltd (a BT Group subsidiary) receiving licences. Vodafone and Telefonica launched their 4G services in August 2013, while Three started its London-based release in December 2013, followed by national roll-out in March 2014.

4G population coverage increased by 8.5 percentage points in the UK in 2015

In six of our 18 comparator countries, 4G population coverage⁸² was 99% or higher at the end of 2015; South Korea and Singapore had the highest coverage at 99.9%. The availability of 4G mobile services is higher in countries where a high proportion of the population is located in urban areas, where it is typically most economic to deploy mobile networks.

The UK ranked ninth⁸³ of our 18 comparator countries and second among the EU5 countries, behind Germany, at the end of 2015, at 92.5%, 8.5 percentage points (pp) higher than a year previously.

Figure 3.3 4G population coverage: end-2015



Source: IHS

Note: 4G is the fourth generation network technology deployed by cellular operators. The definition is limited to those networks using one of the LTE (long term evolution) standards such as FDD-LTE

⁸² In order to provide a comparative benchmark across all 18 countries, 4G mobile coverage in the UK encompasses outdoor coverage from at least one operator. This differs from the 4G (72.2%) coverage stated in our *Connected Nations 2016* report, which focuses on the percentage of premises that have indoor coverage from all operators.

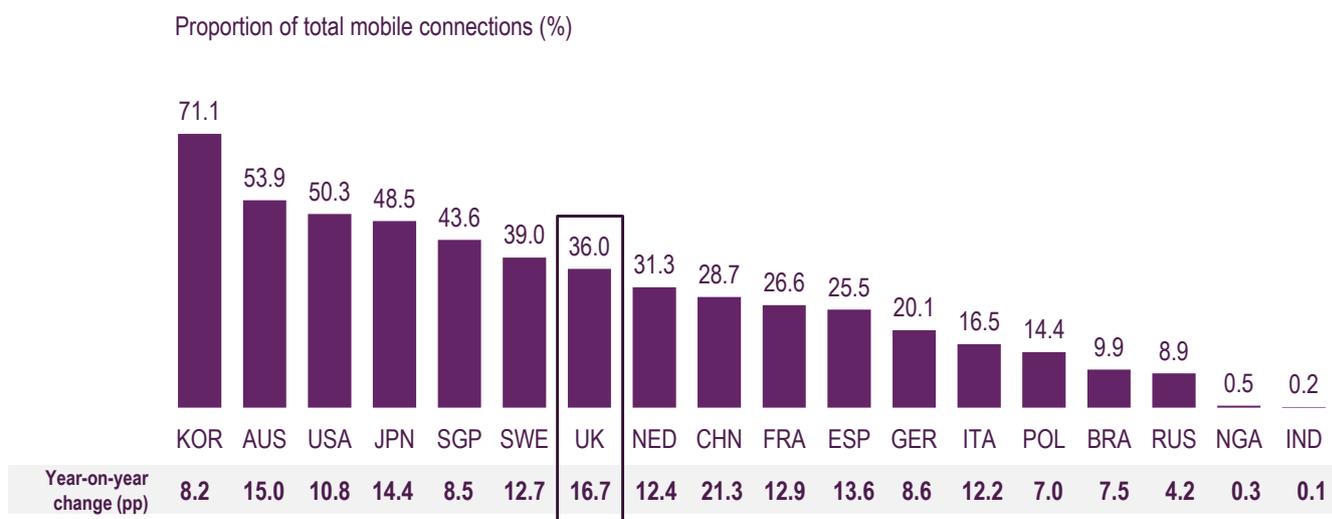
⁸³ In the *Broadband services* section of this chapter, the UK ranks tenth among 19 comparator countries.

(frequency division duplexing LTE) or TD-LTE (time division LTE); HSPA+ networks or WiMAX networks are not included.

In the UK, 36% of mobile connections were 4G at the end of 2015

Take-up of 4G services is typically highest in countries where the commercial launch of 4G services occurred earlier. South Korea had the highest proportion of mobile connections that were 4G-enabled at the end of 2015, at 71.1%. The UK ranked seventh of the 18 comparator countries, while among the EU5 countries the UK had the highest proportion of mobile connections that were 4G, at 36%. All our comparator countries had an increase in take-up of 4G services in 2015, with the UK experiencing the second highest increase (16.7pp) after China (21.3pp).

Figure 3.4 4G mobile connections as a proportion of total mobile connections: end-2015



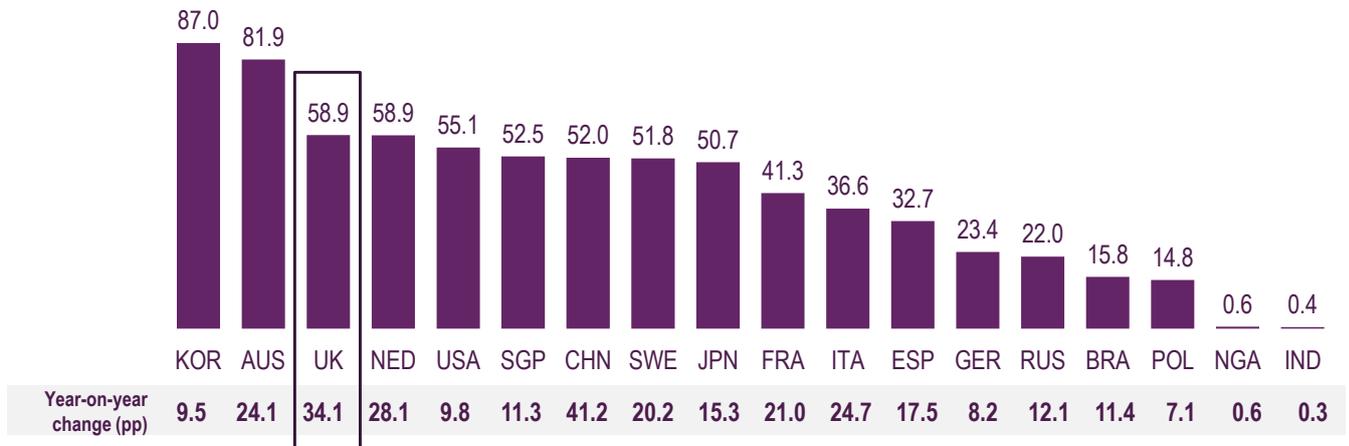
Source: IHS / industry data / Ofcom

In half of our comparator countries 4G revenues accounted for more than 50% of total mobile service revenues in 2015

South Korea had the highest proportion of total mobile revenues generated by 4G mobile services in 2015, at 87%. In the UK, 4G revenues accounted for 59% of total mobile service revenues in 2015, the third highest proportion among our comparator countries.

Figure 3.5 4G mobile revenue as a proportion of total mobile revenue: 2015

Proportion of total mobile revenues (%)

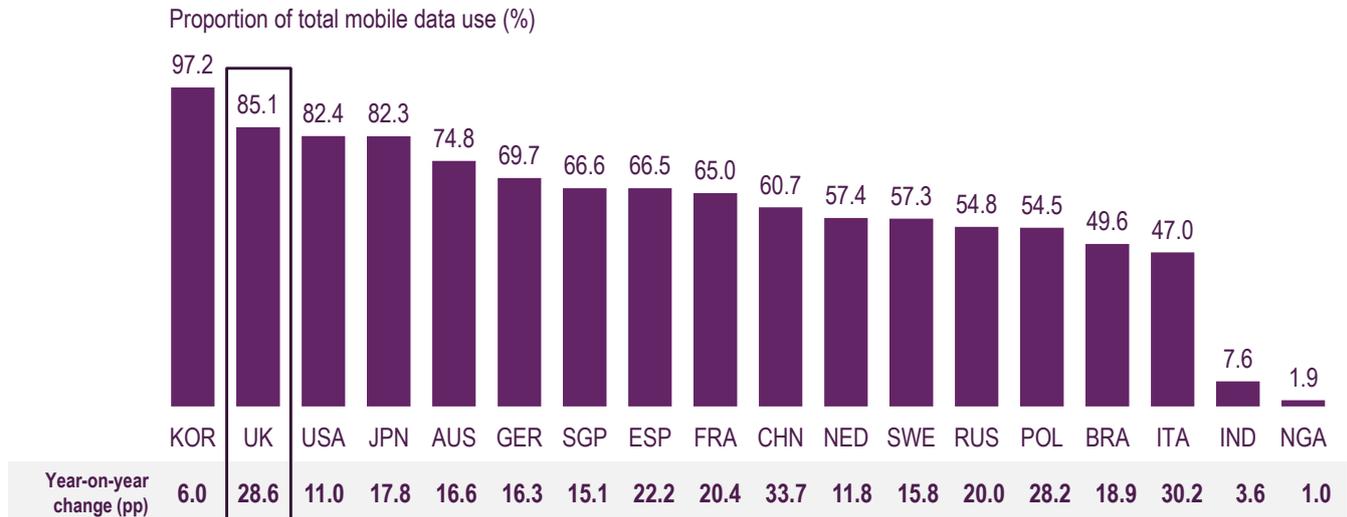


Source: IHS / industry data / Ofcom

In the UK, 85.1% of mobile data use was generated by 4G services in 2015

In most comparator countries, more than half the total mobile data use was generated by 4G services in 2015, led by South Korea, where almost all mobile data use was 4G (97.2%). This is due to the very high population coverage in South Korea and the high number of 4G mobile connections as a proportion of total mobile connections. The UK had the second highest proportion of 4G mobile data use in 2015, at 85.1%, 28.6pp higher than in 2014.

Figure 3.6 4G mobile data use as a proportion of total mobile data use: 2015

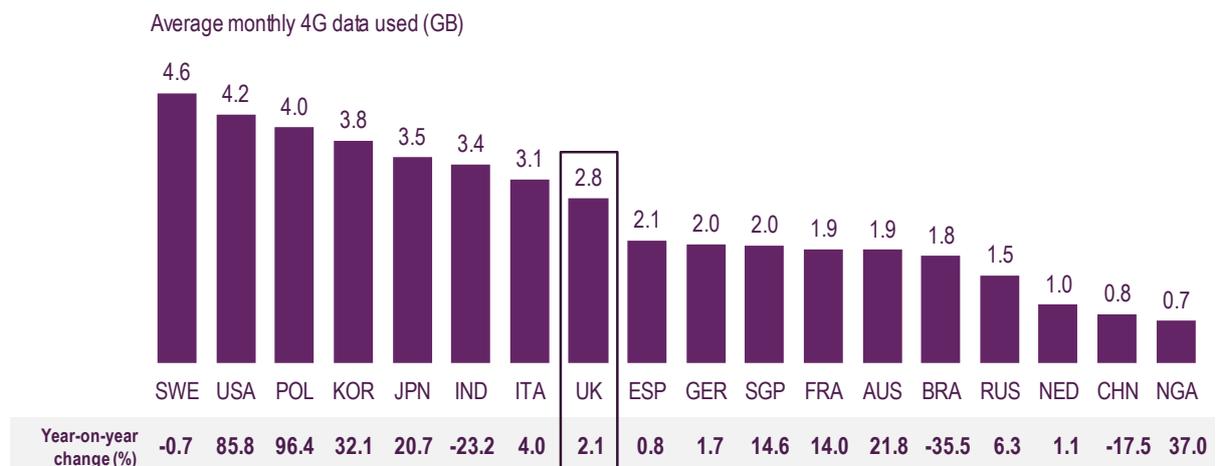


Source: IHS / industry data / Ofcom

Sweden had the highest average monthly 4G mobile data use per 4G connection, of all our comparator countries in 2015, at 4.6GB

Average monthly 4G mobile data use was 2.8GB in the UK in 2015, eighth among our comparator countries. The majority of the countries saw an increase in 2016, and 4G data use in Poland and the US almost doubled compared to the previous year. In the UK, the average monthly 4G mobile data use per 4G connection increased by 2.1% in 2015.

Figure 3.7 Average monthly 4G data use per 4G connection: 2015



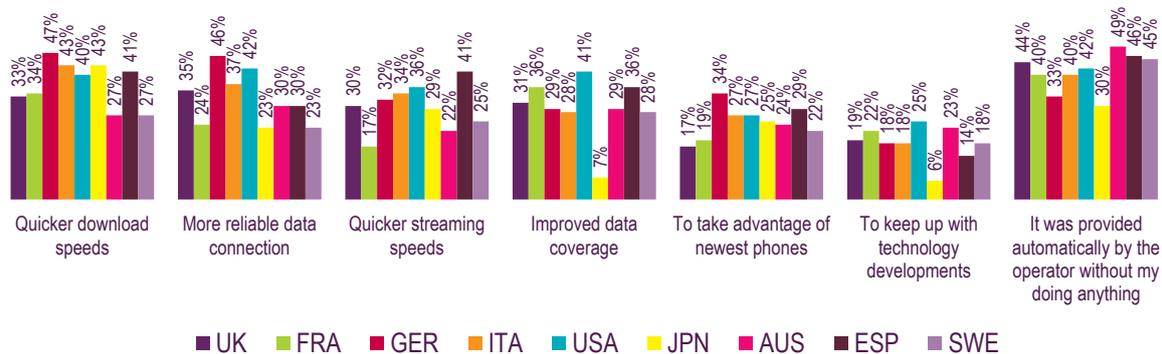
Source: IHS

In the UK, 33% of respondents chose 4G for its quicker download speed in 2016

In the UK, the most common reason for choosing 4G, among respondents who either had or were likely to get a 4G service, was that the operator automatically provided the service to them (44% of respondents). Around three in ten respondents in the UK chose 4G for its quicker download or streaming speed, more reliable data connection or improved data coverage. Less than two in ten respondents in the UK chose 4G in order to take advantage of the latest handsets or to keep up with technology developments (17% and 19% respectively).

Figure 3.8 Reasons for choosing 4G: 2016

Proportion of respondents who have or are likely to get 4G (%)



Source: Ofcom consumer research, 2016

Base: All respondents who have or are likely to get a 4G contract, UK=609, FRA=607, GER=419, ITA=689, USA=666, JPN=424, AUS=680, ESP=705, SWE=659

Q.26 You said that you have/ are likely to get a 4G service [in the next 12 months]. Which of the following are reasons why you got/ are likely to get a 4G contract?

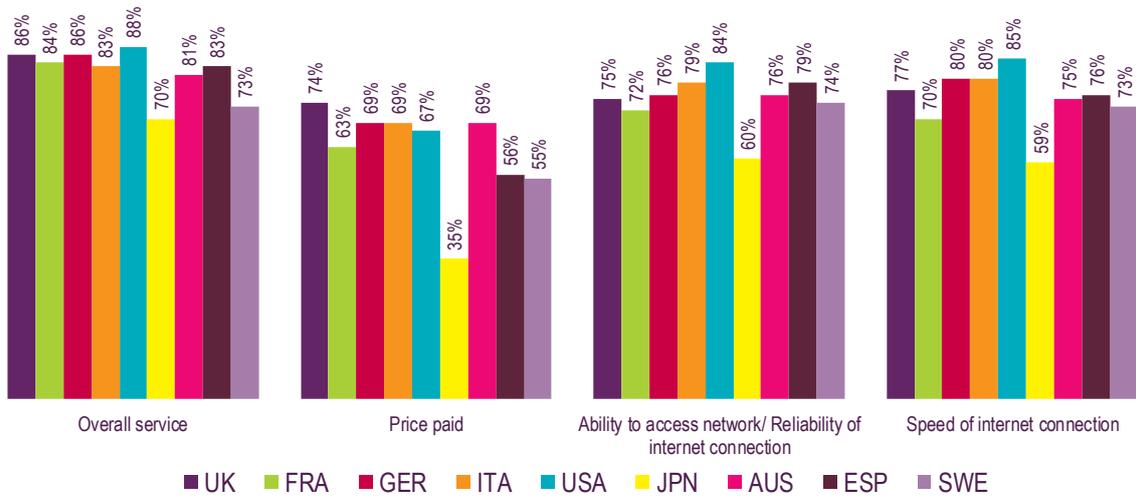
In the UK, over eight in ten respondents with 4G services on their smartphone were satisfied with the overall service

In all our comparator countries, a higher proportion of people with 4G indicated they were satisfied with their overall mobile service than with the price paid. At least eight in ten respondents said they were satisfied with their service in all countries except Japan (70%) and Sweden (73%).

The UK had comparatively high levels of satisfaction with the price paid for mobile phone services (74%), while satisfaction with the reliability, and the speed of the internet connection were 75% and 77% respectively.

Figure 3.9 Satisfaction with 4G mobile phone services: 2016

Proportion of those with 4G on their smartphone (%) – net rating 8-10 on aspects of service



Source: Ofcom consumer research, 2016

Base: All respondents with a smartphone who are on a 4G network, UK=455, FRA=454, GER=290, ITA=466, USA=485, JPN=331, AUS=515, ESP=507, SWE=523

Q.27 To what extent are you satisfied or dissatisfied with the following aspects of your mobile phone service?

3.2 The telecoms industry

Mobile voice and mobile data services generated 63.8% of total telecoms revenues across our comparator countries in 2015

Total retail telecoms revenues across our comparator countries were £597bn in 2015. Mobile voice services generated the greatest proportion of this total in 2015, at 32.2% (£192bn), followed by mobile data at 31.6% (£188bn), while fixed broadband contributed 22.0% (£131bn) and fixed voice 14.2% (£85bn).

Figure 3.10 Total comparator country retail telecoms revenues, by sector: 2010 - 15

Revenue (£bn)



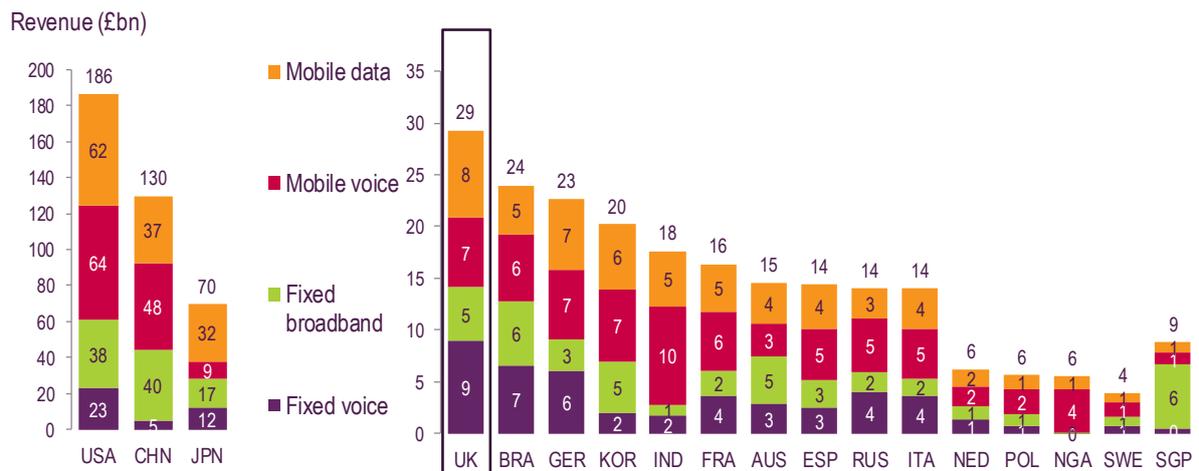
Source: IHS / industry data / Ofcom

Note: Fixed voice revenues include managed VoIP revenues; fixed and mobile voice revenues include access/line rental revenues and may include revenues relating to bundled data services. All figures expressed in nominal terms.

The UK had the fourth highest retail telecoms revenues of all comparator countries in 2015

The US had the highest retail telecoms revenues of all comparator countries, at £186bn in 2015. Between them, the US and China generated more than half (52.9%) of the total. The UK generated £29bn, the fourth highest total of our comparator countries. Mobile services (mobile data and mobile voice) made up the greatest proportion of telecoms revenues in all the countries we looked at, except for Australia and Brazil. In Australia, fixed broadband, while in Brazil, fixed voice made up the greatest proportion.

Figure 3.11 Telecoms service retail revenues, by country and sector: 2015



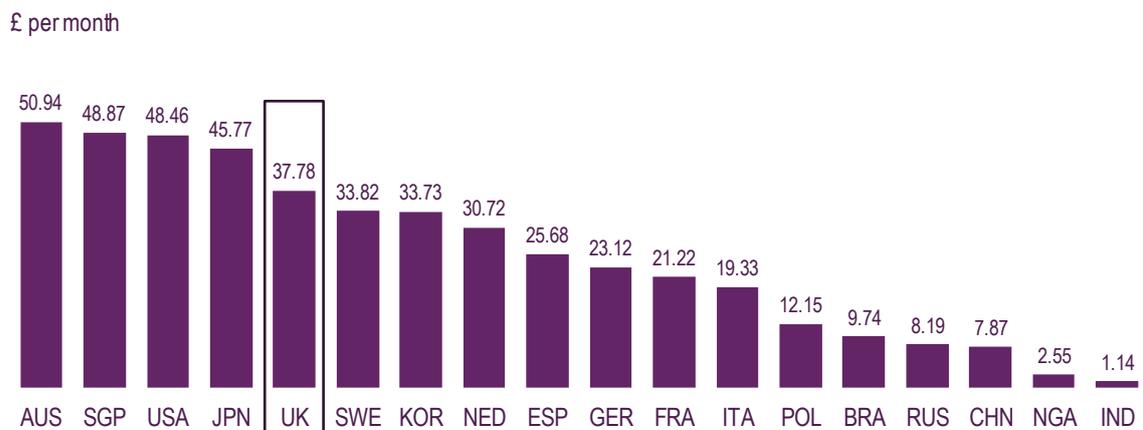
Source: IHS / industry data / Ofcom

Note: Fixed voice revenues include managed VoIP revenues. All figures expressed in nominal terms.

The UK had the fifth highest per-capita monthly telecoms service revenues, of all the comparator countries, in 2015

The UK had the fifth highest average telecoms revenues of the comparator countries, at £37.78 per person per month. Revenues were lowest among the BRIC countries and Nigeria.

Figure 3.12 Per-capita monthly telecoms service revenues: 2015



Source: IHS / industry data / Ofcom.

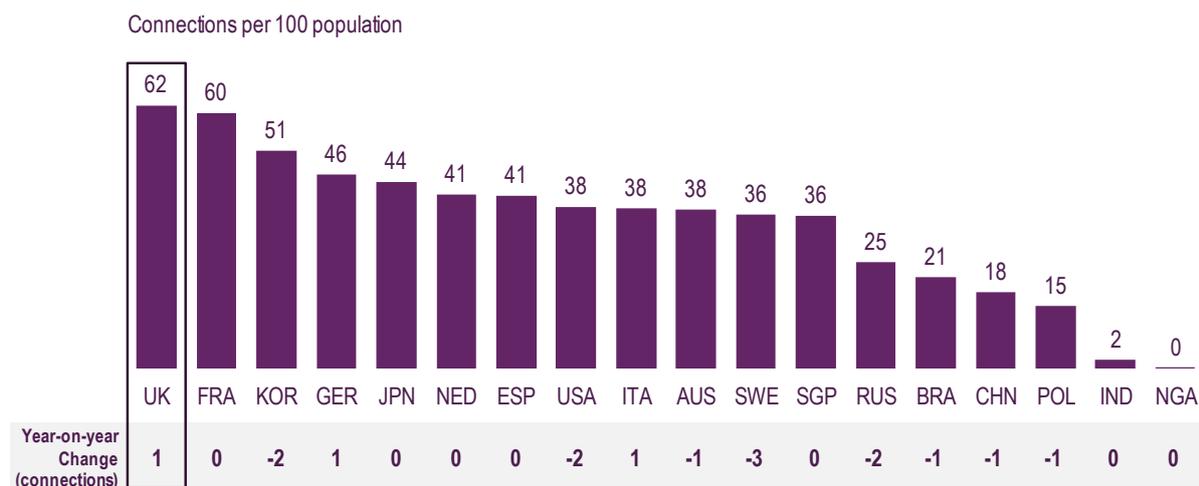
Note: Includes spend by businesses, and is therefore not representative of average consumer spend; all figures expressed in nominal terms.

3.3 Fixed voice services

The UK had the highest number of fixed voice connections per 100 people, of all comparator countries, in 2015

The UK had 62 fixed voice connections per 100 people (including managed VoIP) in 2015, up one connection since 2014. The UK was one of only three comparator countries where fixed voice take-up increased (alongside Germany and Italy).

Figure 3.13 Fixed voice connections per 100 people: end of 2015



Source: IHS / industry data / Ofcom

Note: Includes managed VoIP connections

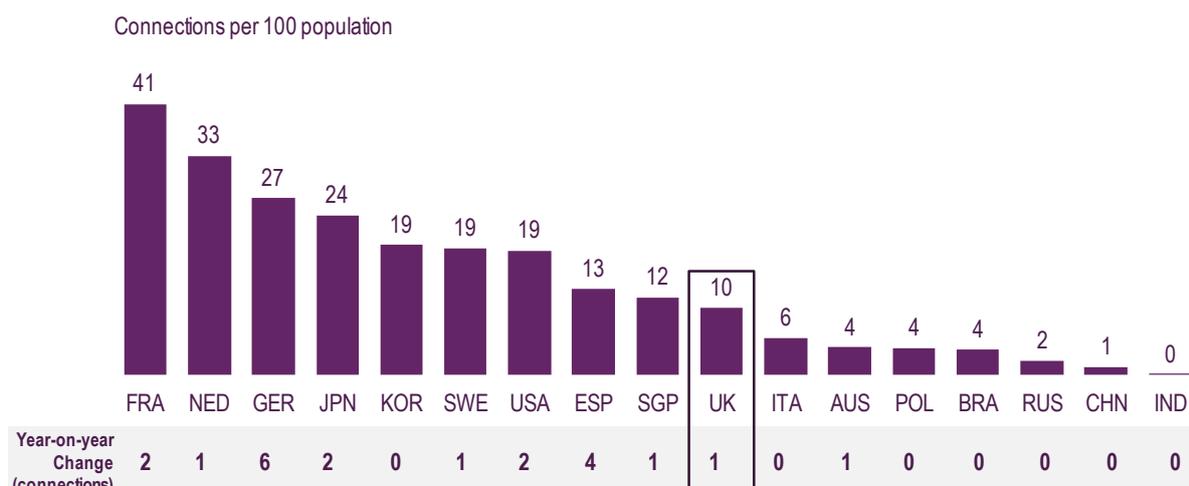
France had the highest number of managed VoIP⁸⁴ connections per 100 people in 2015

The UK had ten managed VoIP⁸⁵ connections per 100 people in 2015, up by one connection since 2014. In the majority of our comparator countries the number of managed VoIP connections per 100 people had increased since 2014, only in South Korea and Brazil did this measure decline.

⁸⁴ Managed VoIP refers to the provision of a packet-switched voice over internet protocol (VoIP) service over a fixed broadband network such as xDSL, FTTP and cable. Managed VoIP includes VoIP as a primary service (such as VoIP over FTTP or naked xDSL) and as a secondary service (such as VoIP over xDSL, where the subscriber also pays a monthly fee for a PSTN line). OTT VoIP services consumed over fixed broadband connections, such as Skype, are not included within the definition of managed VoIP because they do not support emergency calling and are therefore not marketed as landline replacement services.

⁸⁵ The *Narrowband Market Review* consultation document stated that in the UK, managed VoIP is not used in the residential sector to any significant extent.

Figure 3.14 Managed VoIP connections per 100 people: end of 2015



Source: IHS / industry data / Ofcom

Note: Nigeria is not shown on the chart as it has no managed VoIP connections.

The proportion of total fixed voice connections that were managed VoIP increased in all comparator countries in 2015

At 80.1%, the Netherlands had the highest percentage of managed VoIP connections as a proportion of total fixed voice connections in 2015, up by 4.5pp since 2014. India was the lowest, at less than 1%. In the UK, managed VoIP connections made up only 16.2% of the total, twelfth among the 17 comparator countries. However, the UK proportion had increased, by 1.7pp, since 2014. Germany experienced the highest increase, at 11.4pp, followed by Spain at 10.7pp.

Figure 3.15 Proportion of total voice connections that are managed VoIP: end-2015



Source: IHS / industry data / Ofcom

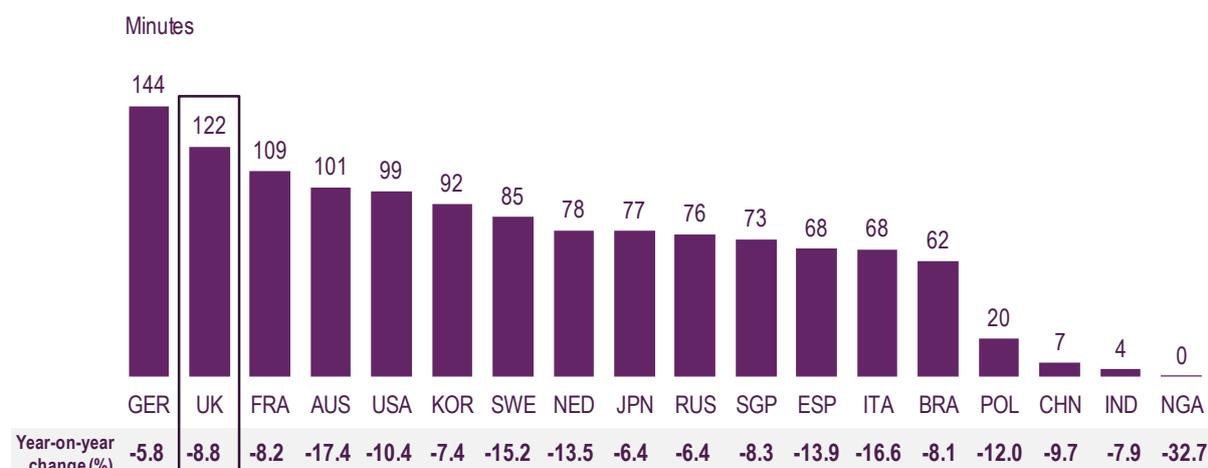
Note: Nigeria is not shown on the chart as it has no managed VoIP connections.

Germany had the highest average minutes of monthly fixed voice calls in 2015

The average number of monthly fixed voice call minutes per person ranged from less than one minute in Nigeria, to just over 144 minutes in Germany. The UK ranked second among our comparator countries, at 122 minutes per person per month. However, this was down by 12 minutes per month (8.8%) since 2014. All other comparator countries experienced declining fixed voice use in 2015, largely due to the continued substitution of fixed voice services with mobile voice services, and growth in the use of alternative communication

methods. While Nigeria had the largest proportional year-on-year fall (32.7%), this was only a small decrease in volume terms.

Figure 3.16 Per capita monthly fixed voice call minutes: 2015

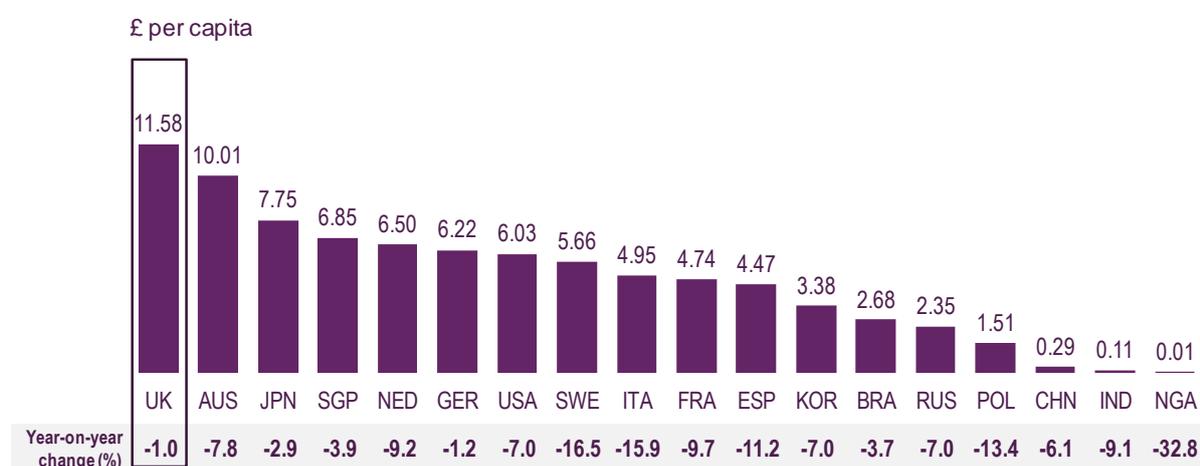


Source: IHS / industry data / Ofcom.
Note: Includes managed VoIP calls.

The UK had the highest average per-capita revenue for fixed voice services in 2015

The highest average revenue for fixed voice services (including managed VoIP services) was generated in the UK in 2015, at £11.58 per person per month. It was lowest in China, India and Nigeria, at less than £1 per person in all three countries. As shown in Figure 3.16, monthly fixed voice call minutes per capita were also lowest in these countries.

Figure 3.17 Average monthly per-capita fixed voice revenues: 2015

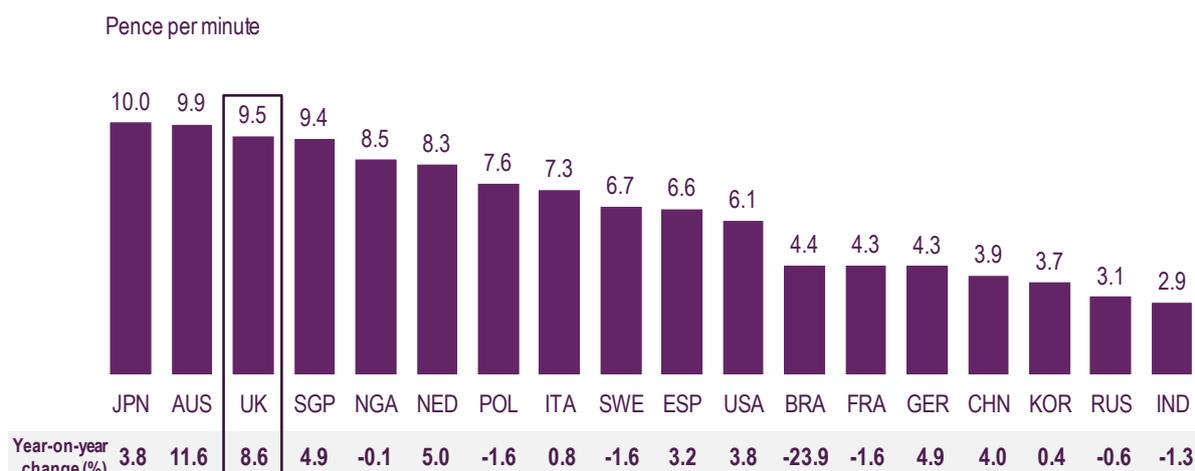


Source: IHS / industry data / Ofcom
Note: Includes managed VoIP revenues. All figures expressed in nominal terms.

The UK had the third-highest average price of a fixed voice call minute, among our comparator countries, in 2015

At 10 pence per minute, the average price of a fixed voice call minute was highest in Japan (though similar to Australia at 9.9 pence). Conversely, it was lowest in India, at 2.9 pence. The UK had the third highest price, at 9.5 pence per minute in 2015, an 8.6% increase compared to 2014.

Figure 3.18 Average price of a fixed voice call minute: 2015



Source: IHS / industry data / Ofcom

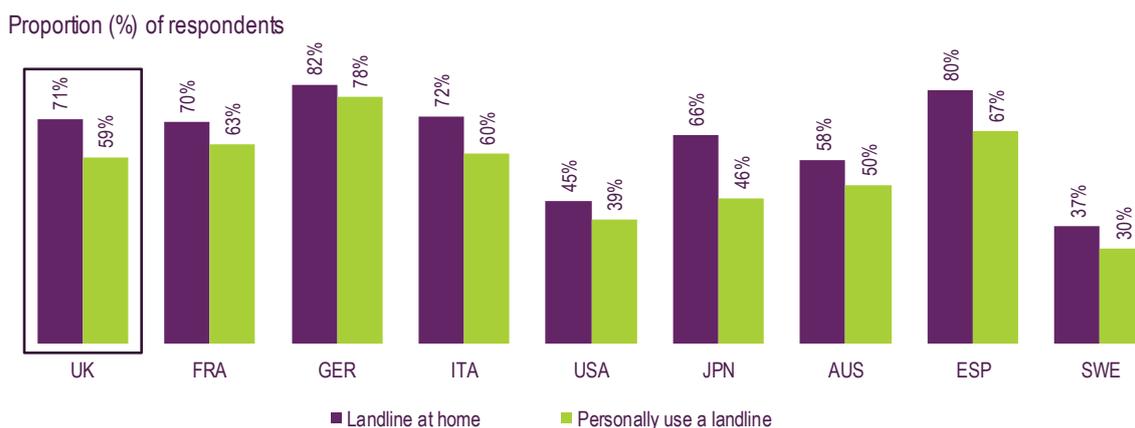
Note: Includes managed VoIP calls. All figures expressed in nominal terms.

Twelve per cent of respondents in the UK did not use their household landline in 2016

Across all our comparator countries, the proportion of people who said they personally used fixed telephony services was lower than the proportion who said they had a landline in their home. In some countries these differences may be driven by the fact that a landline is often required to buy fixed broadband services, so consumers may subscribe to a landline service even if they do not use it for fixed telephony services.

The proportion of respondents who indicated that they have a landline in their home ranged from 37% in Sweden to 82% in Germany. Similarly, the proportion of respondents who used a landline for fixed telephony services ranged from 30% in Sweden to 78% in Germany. In the UK, 71% of respondents said they had a landline, with 59% personally using it. This means that 12% of respondents in the UK did not use their household landline in 2016.

Figure 3.19 Household take-up and personal use of fixed telephony services: 2016



Source: Ofcom consumer research, 2016

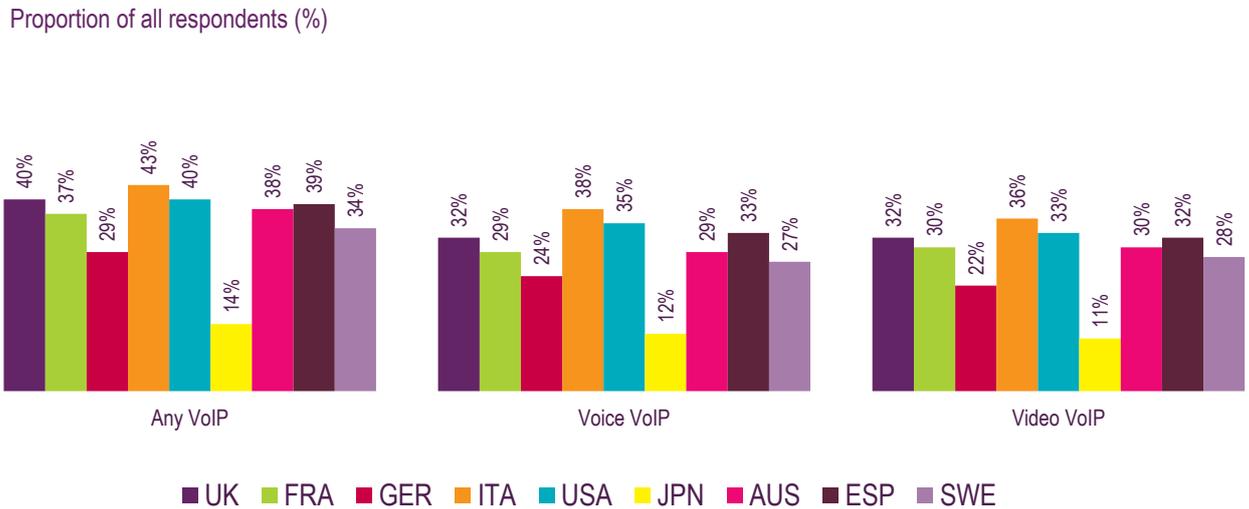
Base: All respondents, UK=1000, FRA=1008, GER=1010, ITA=1032, USA=1016, JPN=1011, AUS=1007, ESP=1016, SWE=1000

Q.4bi Which of the following services do you have in your home? Q.4bii Which of the following services do you personally use at home or elsewhere?

In the UK, 40% of respondents claimed to use voice or video calls through VoIP services at least once a week

In the UK, two in five respondents said they used VoIP services for voice or video calls at least once a week. Equal proportions (32%) used them for voice calls and for video calls. VoIP use in Japan was lower than in all the other comparator countries.

Figure 3.20 Use of VoIP services at least once a week: 2016



Source: Ofcom consumer research, 2016

Base: All respondents, UK=1000, FRA=1008, GER=1010, ITA=1032, USA=1016, JPN=1011, AUS=1007, ESP=1016, SWE=1000

Q.9 How often do you use the internet on any of your devices for each of the following activities? Any VoIP, making voice calls (not video) through VoIP services, making video calls through VoIP services: at least once a week

3.4 Mobile voice and messaging services

The majority of our comparator countries had 99% or higher population coverage⁸⁶ of 2G

Fifteen of our 18 comparator countries had 2G population coverage of 99% or higher at the end of 2015: only in Russia, Nigeria and India was 2G availability lower (at 98%, 96% and 87% respectively).

Figure 3.21 2G mobile network availability: end-2015



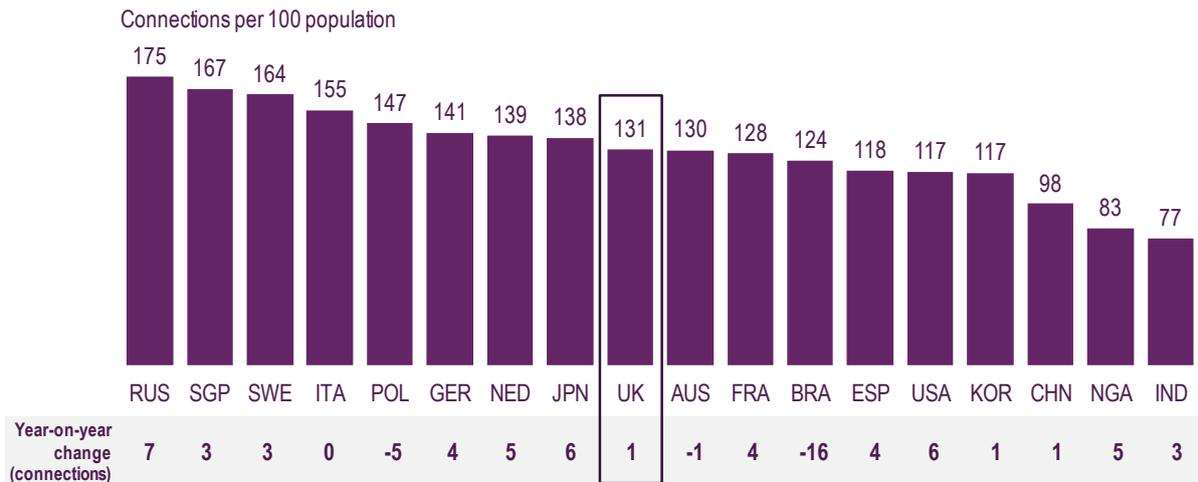
Source: IHS / industry data / Ofcom

The majority of our comparator countries had more mobile connections than people in 2015

The number of mobile connections per 100 people ranged from 77 in India to 175 in Russia in 2015. The UK was ninth of 18, with 131 mobile connections per 100 people. In only three countries (Poland, Australia and Brazil) did the number decrease between 2014 and 2015. Brazil had the greatest decrease, down by 16 connections, following a purge of inactive pre-pay mobile connections. In comparison, Russia experienced the greatest increase, up by seven connections per 100 people.

⁸⁶ Outdoor coverage by at least one operator, geographic coverage would be lower. The UK figure differs from the 67% stated in our *Connected Nations 2016* report, which measures indoor coverage by all operators, voice and text (incl. VoLTE).

Figure 3.22 Mobile connections per 100 people: end of 2015



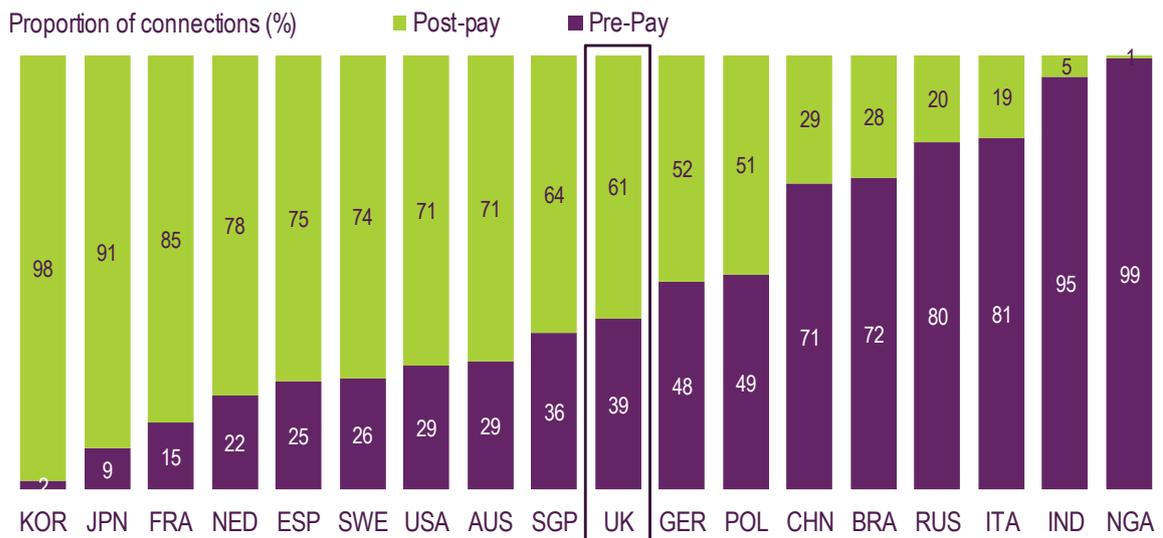
Source: IHS / industry data / Ofcom

Over 60% of mobile connections in the UK were post-pay in 2015

The proportion of mobile connections that were post-pay grew in most of our comparator countries in 2015. This proportion was highest in South Korea, where 98% of connections were post-pay. This compares to 61% in the UK, up 1.7pp compared to 2015, and ranking the UK tenth of the 18 countries.

Conversely, the proportion of mobile connections that were pre-pay was highest in Nigeria, at 99% in 2015. In general, pre-pay connections tend to be more popular in developing countries, probably because they give consumers more flexibility due to the lack of an ongoing financial obligation as well as the increased likelihood of consumers not having easy access to a bank account.

Figure 3.23 Mobile connections, by type: end of 2015

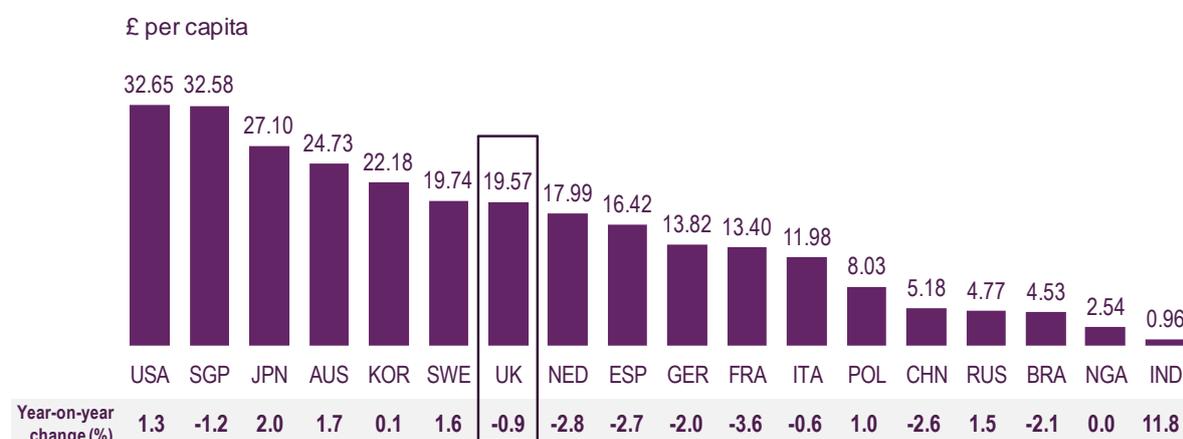


Source: IHS / industry data / Ofcom

Average per-capita monthly mobile retail revenue in the UK was £19.57 in 2015

Per-capita spend on mobile services ranged from £32.65 per month in the US to less than £1 per month in India in 2015. In the UK, the average spend was £19.57 per person – the seventh highest of our comparator countries.

Figure 3.24 Average per-capita monthly retail mobile revenue: 2015



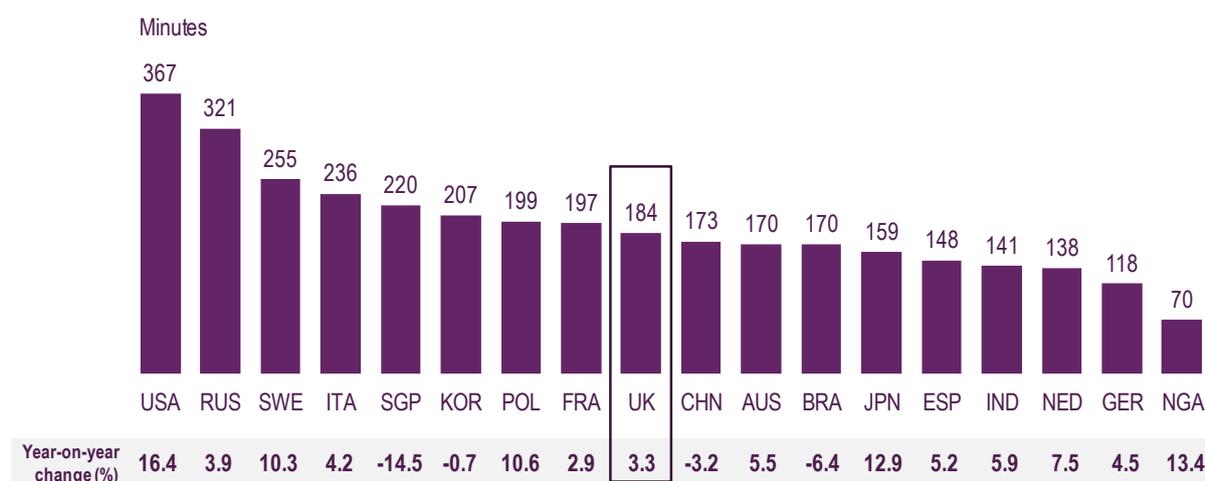
Source: IHS / industry data / Ofcom.

Note: All figures expressed in nominal terms.

Most comparator countries saw an increase in the number of average monthly mobile call minutes per person

Average outgoing per-capita mobile call minutes were highest in the US in 2015, at 367 per month; the US also had the largest percentage increase since 2014 (16.4%). Average outgoing monthly mobile call minutes per person increased in the majority of our comparator countries in 2015, with the exception of Singapore, South Korea, China and Brazil. In the UK, average use increased by 3.3% to 184 minutes per person, putting the UK ninth highest of the comparator countries.

Figure 3.25 Average per-capita monthly mobile voice call minutes: 2015



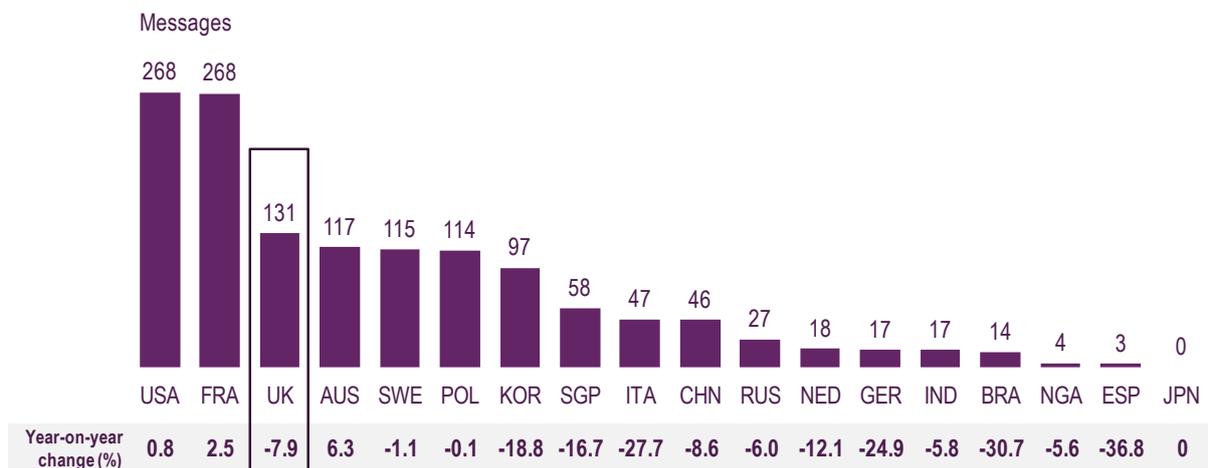
Source: IHS / industry data / Ofcom

The UK had the third highest average number of monthly mobile messages per person

The average number of monthly mobile messages per person (which includes SMS and MMS messages) ranged from zero in Japan (where, as mentioned earlier, consumers tend

to use email and instant messaging rather than traditional mobile messaging services) to 268 in the US and France. The UK had the third highest average mobile messaging use among the comparator countries, with 131 messages per person per month. In only three countries (the US, Australia and France) was there a year-on-year increase, while all the other countries saw a decline (down 7.9% in the UK). This decline was mainly due to increasing smartphone take-up, as these devices enable consumers to access alternative text-based services, such as email and instant messaging.

Figure 3.26 Average per-capita monthly mobile messages: 2015



Source: IHS / industry data / Ofcom

Note: Includes SMS and MMS

In the majority of our comparator countries SMS text messaging was the most popular regular activity undertaken on a mobile phone

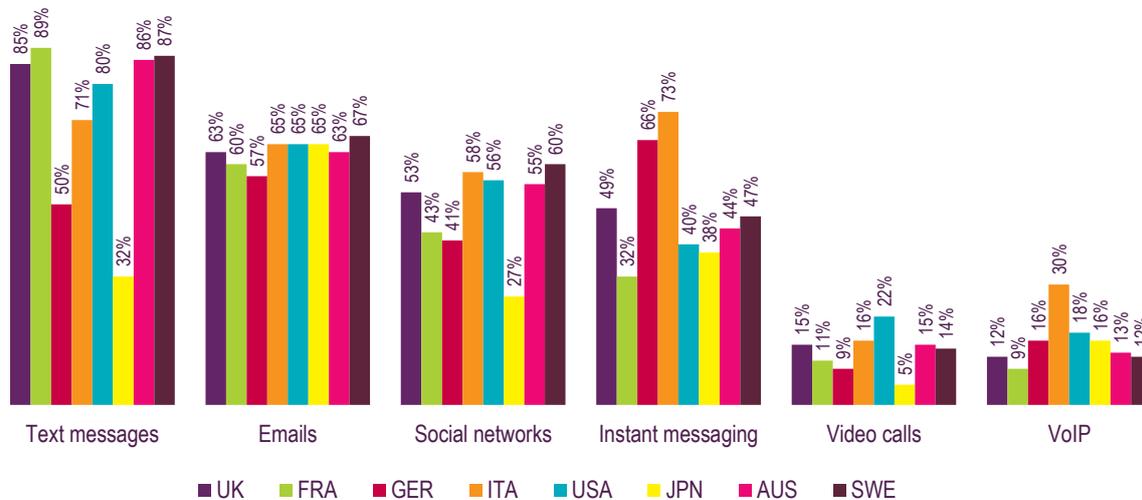
In five out of eight of the comparator countries in which our consumer research took place, SMS text messaging was the most common communication activity undertaken at least once a week on a mobile phone. Eight in ten or more mobile phone users aged 18-75 in these countries reported texting at least once a week. In the UK, the majority (85%) cited texting at least weekly, compared to around half (49%) for instant messaging.

Email was a popular activity across our comparator countries, with more than half of respondents in all eight countries claiming to use email on their phone at least once a week. In the UK 63% of respondents said that they regularly did this.

Across our comparator countries, VoIP and video calls were less likely to be regularly undertaken on a mobile phone than text messages, emails, social networking or instant messaging. In the UK VoIP was 12%, and video calls 15%.

Figure 3.27 Communication activities on a mobile phone at least once a week: 2016

Proportion of those with a mobile phone (%)



Source: Deloitte Global Mobile Consumer Survey 2016

Base: All adults 18-75 who have a phone or smartphone

UK=3712, GER=1838, JPN=1431, AUS=1864, ITA=1862, SWE=1906, FRA=1847, USA=1774

Q.34 Please state which, if any, you have used (at least once a week)?

Note: Text messaging is not relevant for Japan, as respondents may have confused text messaging with similar services that are available.

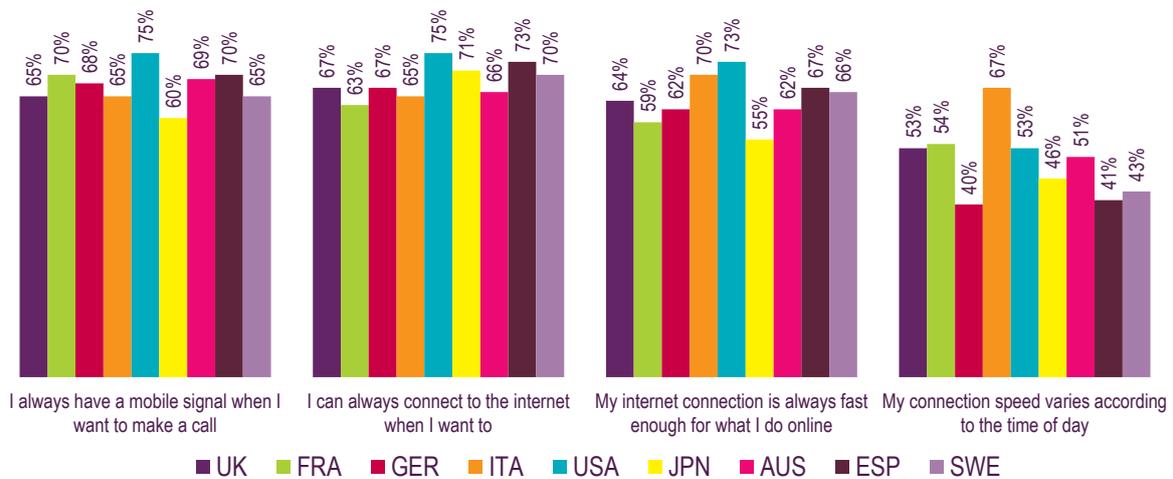
Two-thirds of mobile users in the UK stated that they always have a mobile signal

In the UK, around two-thirds of mobile users claimed that they always had a mobile signal when they wanted to make a voice call, that they could always connect to the internet on their mobile network when they wanted to, and that they had a fast-enough internet connection.

Of our comparator countries, the US had the highest proportion of respondents who claimed to always have a mobile signal when they wanted to make a voice call (75%). Italy had the highest proportion of mobile users who found that mobile speed varied according to the time of the day (67%). In the UK, 53% of respondents said that their mobile speed varied throughout the day.

Figure 3.28 Mobile phone connectivity: 2016

Proportion of those with a mobile phone (%)



Source: Ofcom consumer research, 2016

Base: All respondents who use a smartphone or mobile phone, UK=799, FRA=825, GER=861, ITA=939, USA=782, JPN=759, AUS=851, ESP=877, SWE=854 (mobile signal). Base: all respondents who use a smartphone, UK=730, FRA=781, GER=791, ITA=922, USA=695, JPN=740, AUS=794, ESP=873, SWE=811 (internet connection)

Q.24 Thinking about when you use your mobile phone, please select an answer to each of the following...

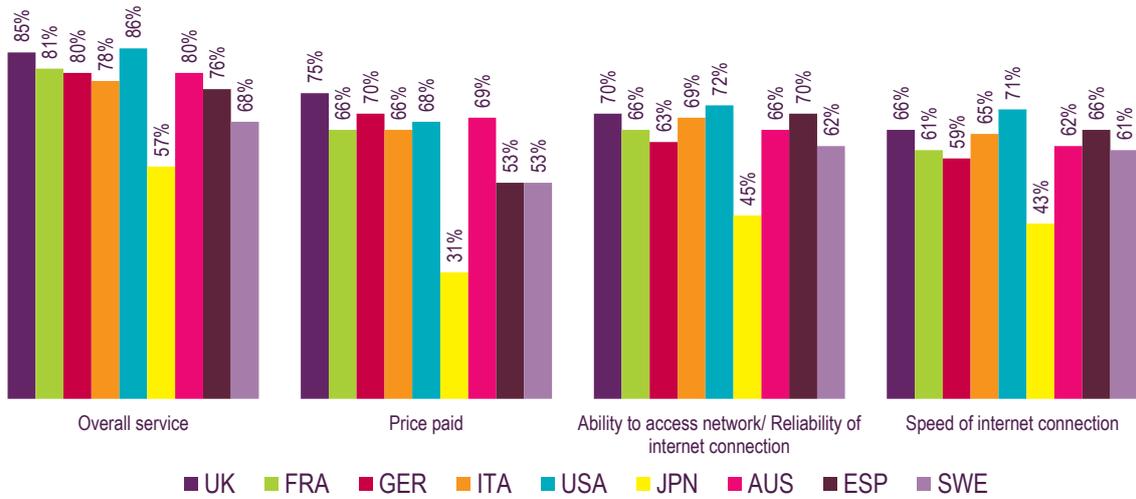
Eighty-five per cent of respondents in the UK indicated that they were satisfied with their overall mobile service

Consumer satisfaction with different aspects of mobile services was comparatively high in the UK, with more than six in ten respondents saying that they were either very, or fairly, satisfied with the price paid for their mobile service, the ability to access the network and the speed of their internet connection.

Overall satisfaction with mobile services was 80% or higher in five out of nine of our comparator countries in which our consumer research took place, with the UK at 85%. By comparison, satisfaction levels with all of the mobile service aspects we asked about were low in Japan, particularly in relation to price (31%).

Figure 3.29 Satisfaction with mobile service: 2016

Proportion of those with a mobile phone (%) – very or fairly satisfied with aspects of service



Source: Ofcom consumer research, 2016

Base: All respondents with a mobile phone, UK=799, FRA=825, GER=861, ITA=939, USA=782, JPN=759, AUS=851, ESP=877, SWE=854

Q.27 To what extent are you satisfied or dissatisfied with the following aspects of your mobile phone service?

3.5 Broadband services

This section benchmarks the UK's performance against that of comparator countries, in terms of various fixed and mobile broadband market indicators.⁸⁷

In previous years, the *European Broadband Scorecard* has been published as a stand-alone report, comparing broadband development across EU countries. However, this year we have included the Scorecard as a section within the Telecoms chapter of the *International Communications Market Report*, and have widened its scope by including additional non-EU comparator countries. In addition to the data on the 18 countries included in this report, we have included Portugal, to provide an example of a country where duct and pole access already exists. Our aim is to provide a more comprehensive view of the development of fixed and mobile broadband infrastructure and services in different countries.⁸⁸

We focus on the UK's position using broadband metrics including coverage, take-up, speed and choice, wherever sufficiently comparable, reliable and consistent data are available. A comparison of fixed broadband service pricing can be found in the *International pricing benchmarking* chapter of the report (Chapter 2).

For the purpose of continuity with previous reports, we also compare the metrics for the EU5 and EU28,⁸⁹ where such data are available.

3.5.1 Coverage

The UK was one of eight comparator countries where ADSL was available to 99% or more households in 2015.

In eight of our comparator countries, including the UK, ADSL networks have been deployed to 99% or more households.⁹⁰ Nigeria was the only comparator country in which ADSL networks had been deployed to less than half of all households (4%), although coverage there had increased marginally since 2014.

⁸⁷ Mobile broadband includes all data connections made via 3G or 4G cellular networks, including those made via mobile handsets and using dedicated mobile data dongles and SIMs.

⁸⁸ Portugal (in addition to Spain and France) has used duct access to build extensive FTTP networks, encouraging innovation and providing improved service quality and faster broadband speeds. https://www.ofcom.org.uk/_data/assets/pdf_file/0021/63444/digital-comms-review.pdf

⁸⁹ The EU5 and EU28 appendices can be found here: <https://www.ofcom.org.uk/research-and-data/broadband-research/eu-broadband-scorecard>

⁹⁰ It is important to note that some premises in ADSL-enabled areas may not be able to receive broadband services, or may only be able to access very low speeds due to reasons such as long length, or poor quality, of the copper telephone line from the premises to the local exchange.

Figure 3.30 Percentage of households in areas served by ADSL broadband: year-end 2015



Source: IHS

Note: NGA is the country code for Nigeria, and does not refer to next generation access technologies. All figures have been rounded to the nearest whole number.

The UK ranked eighth in cable broadband coverage

Singapore had the highest coverage of cable broadband network, deployed largely by StarHub Ltd, at 99% of households at the end of 2015.

The Netherlands had the second highest cable availability, at 95%, followed by the US (90%), while the UK ranked eighth (47%). In the UK, Virgin Media (the largest cable broadband provider), is extending its DOCSIS3.1 network through ‘Project Lightning’,⁹¹ which is expected to extend cable and FTTP to up to 60-65% of UK premises by 2020.

⁹¹ <http://www.virginmediabusiness.co.uk/news-and-events/news/news-archives/2015/Virgin-Media-and-Liberty-Global-announce-largest-investment-in-UKs-internet-infrastructure-for-more-than-a-decade/>

Figure 3.31 Percentage of households in areas served by cable broadband: year-end 2015



Source: IHS

Note: NGA is the country code for Nigeria, and does not refer to next generation access technologies. All figures have been rounded to the nearest whole number.

The UK ranked fifth in terms of fibre network availability

All our comparator countries have been focusing on expanding their coverage of broadband networks to provide faster broadband access to more of their population, and adopting different investment approaches to network deployment. In some countries, network deployment initiatives have been funded by service providers and/or launched through public-private partnerships, while in many others, publicly-funded projects have been launched to expand networks into areas where commercial investment is not viable.

In the UK, total household fibre availability (which includes VDSL and some fibre-to-the-premises) was 84% at the end of 2015, an increase of four percentage points since the end of 2014. Among all the comparator countries, the UK ranked fifth, behind the Netherlands (100%), South Korea (100%), Japan (97%) and Singapore (95%).

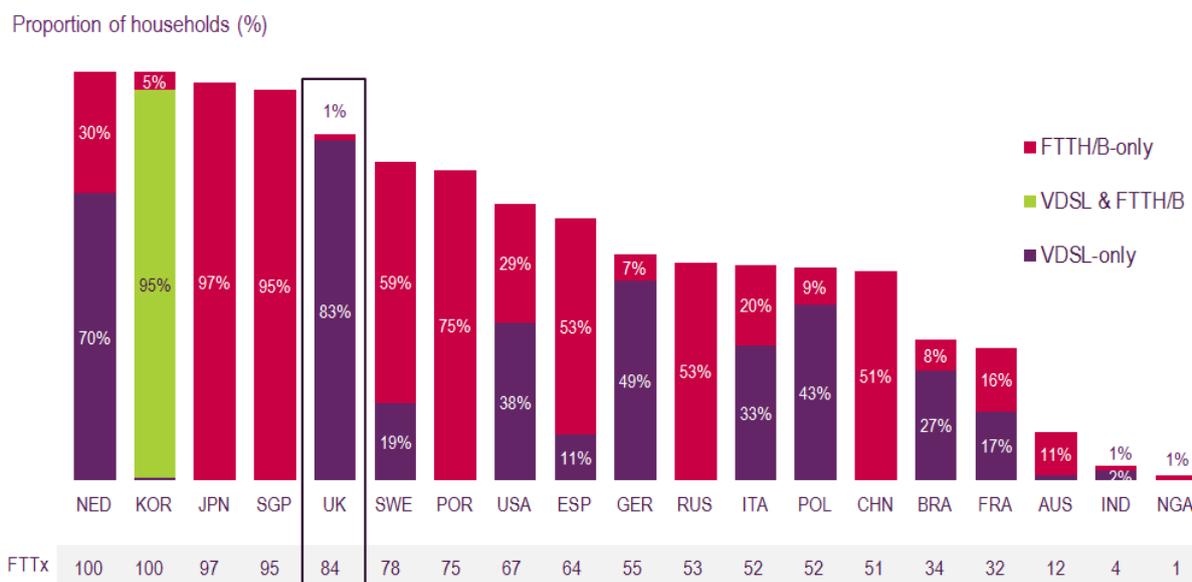
The UK ranked second in terms of VDSL coverage, at 83% of households, an increase of four percentage points since 2014, behind South Korea (95%). The Netherlands, which led the overall availability of FTTx, ranked third on VDSL (70%), followed by Germany (49%) ranked fourth.

'Full fibre' technologies (FTTH/B) were available to just over 1% of UK households by the end of 2015,⁹² lower than all the other comparator countries except India and Nigeria. This is in part a result of BT's decision to use VDSL for the last-mile connectivity of most of its fibre broadband network, rather than FTTH/B. In contrast to the UK, countries such as South Korea, Singapore and Japan had availability to over 95% households in 2015.

A number of providers, of varying scale and reach, are committed to deploying full fibre services and we would expect to see coverage increase over the coming year.

⁹² In the *Connected Nations* 2016 report, we have reported that just under 2% of premises are covered by FTTP networks.

Figure 3.32 Percentage of households in areas served by FTTx broadband networks (including VDSL and FTTH/B): year-end 2015



Source: IHS

Note: NGA is the country code for Nigeria, and does not refer to next generation access technologies. All figures have been rounded to the nearest whole number.

UK superfast broadband availability increased in 2015, although it continued to lag behind countries such as South Korea, Japan and Singapore

At the end of 2015, standard fixed broadband services with an advertised speed of 10Mbit/s or more were available to almost all households in three comparator countries (South Korea, Japan and Singapore). Standard broadband with advertised speeds of 10Mbit/s or more was available to 97% of households in the UK, an increase of one percentage point (pp) since 2014. The UK ranked seventh in terms of availability of superfast broadband (SFBB) products (those with advertised speeds of 30Mbit/s or more), at 88% of households. Services with advertised speeds of 100Mbit/s or more were available to 48% of households in the UK.

In Ofcom's *Connected Nations 2016* report,⁹³ we state that 100%⁹⁴ of UK premises were able to receive fixed broadband⁹⁵ services by June 2016, and that 89% were able to receive superfast broadband services with an actual download speed of 30Mbit/s or higher.⁹⁶

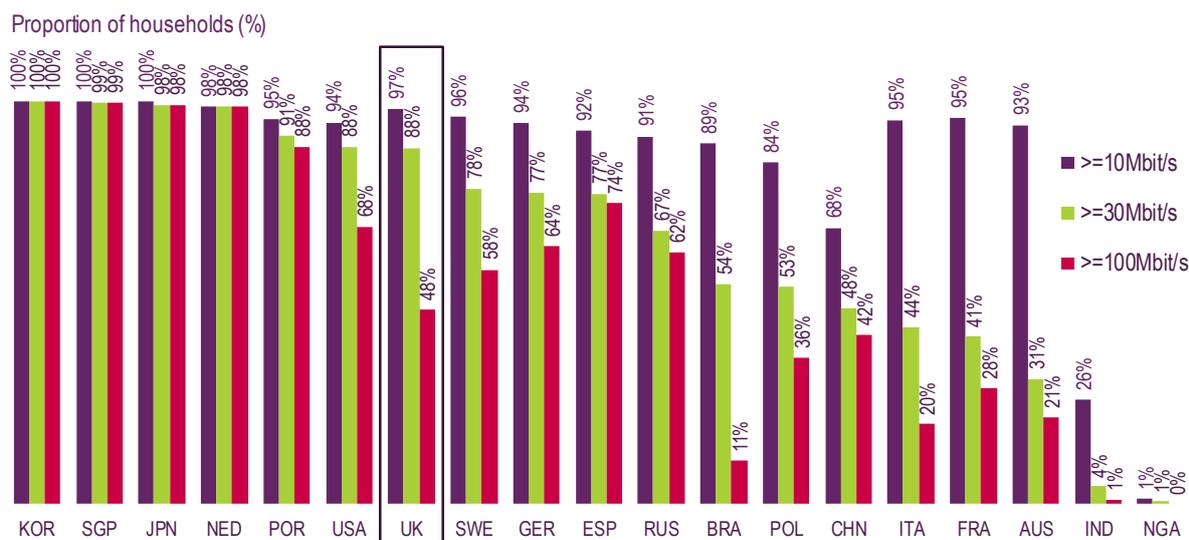
⁹³ <https://www.ofcom.org.uk/research-and-data/infrastructure-research/connected-nations-2016>

⁹⁴ There may be a very small number of UK residential properties that may not be able to receive broadband services, or may only be able to access very low speeds.

⁹⁵ Fixed broadband is a data service or connection generally defined as being 'always on' and providing a bandwidth greater than narrowband connections.

⁹⁶ We calculated this based on detailed premises-level data inputs provided by UK communications providers.

Figure 3.33 Percentage of households passed by fixed broadband networks: year-end 2015



Source: IHS

Note: NGA is the country code for Nigeria, and does not refer to next-generation access technologies. All figures have been rounded to the nearest whole number.

Availability and adoption of ultrafast broadband⁹⁷ is increasing

For this report, we have defined ultrafast services as those delivering a download speed of 300Mbit/s or more,⁹⁸ delivered over fibre or hybrid fibre-coaxial cable networks.⁹⁹

The deployment of ultrafast broadband has started to gather pace, although roll-out is largely limited to developed countries mainly in Asia-Pacific that already have high availability of superfast broadband. Singapore ranked first, with universal availability of ultrafast broadband, followed by South Korea at 98%, as at September 2016.

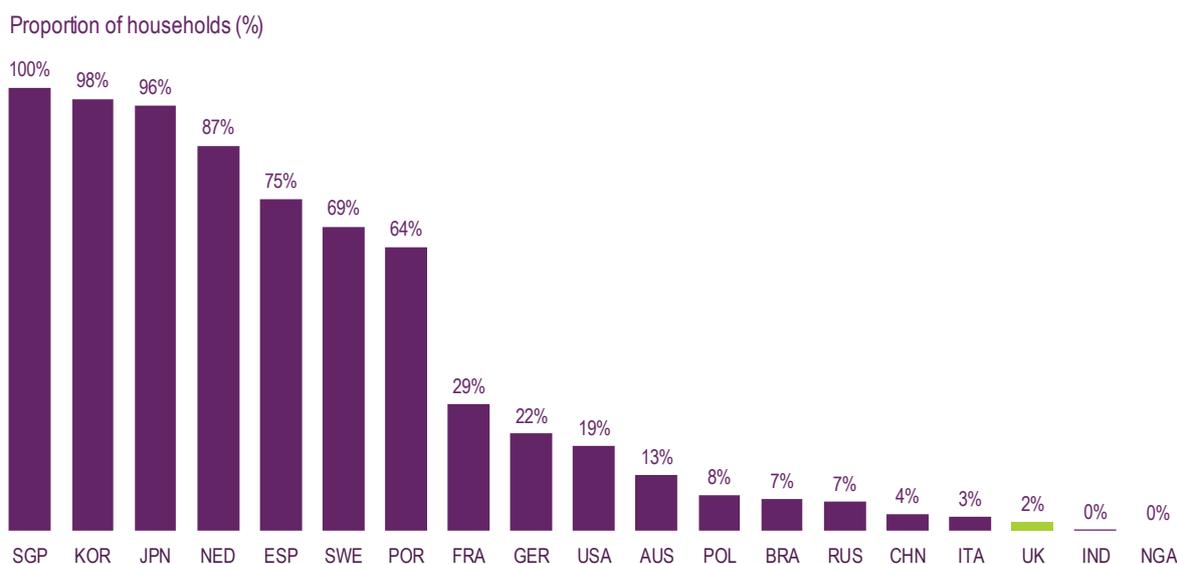
The availability of ultrafast broadband networks is relatively lower in Europe. Among our European comparator countries, only four had ultrafast household availability of 50% or more, with the Netherlands in the lead (87%) due to the availability of ultrafast cable broadband services followed by Spain (75%), Sweden (69%) and Portugal (64%). Among the EU5, France had the highest ultrafast availability at 29%. In the UK, ultrafast broadband was available to 2% of households, the lowest among all comparator countries except India and Nigeria.

⁹⁷ We were not able to obtain data on household availability of ultrafast broadband services from IHS (which provided the coverage-related metrics in the rest of this chapter) and we therefore use September 2016 figures provided by Analysys Mason, which are based on the availability of ultrafast networks capable of supporting advertised speeds of 300Mbit/s or higher. Due to the difference in methodology and time period for which the information is available, the ultrafast broadband product availability data shown below are not comparable with other coverage information in this chapter.

⁹⁸ There is not yet a consensus on a definition for ultrafast services. We will continue to monitor the coverage of these faster services and may, if appropriate, refine our definition as the market evolves.

⁹⁹ Ultrafast services rely on technologies such as GPON, EPON, active Ethernet, DOCSIS3.0 or 3.1, and G.fast.

Figure 3.34 Percentage of households in areas served by ultrafast broadband products (with advertised speeds of 300Mbit/s or more): September 2016



Source: Analysys Mason

Note: NGA is the country code for Nigeria, and does not refer to next generation access technologies. All figures have been rounded to the nearest whole number.

Six comparator countries had 4G mobile broadband population coverage of 99% or more

Eight of our comparator countries had at least 95% population in areas served by 4G mobile broadband, and six (Japan, South Korea, Singapore, Poland, the Netherlands and Sweden) had 99% or higher. The UK ranked tenth¹⁰⁰ among our 19 comparator countries, with 93% population coverage,¹⁰¹ an increase of 9pp compared to end-2014.

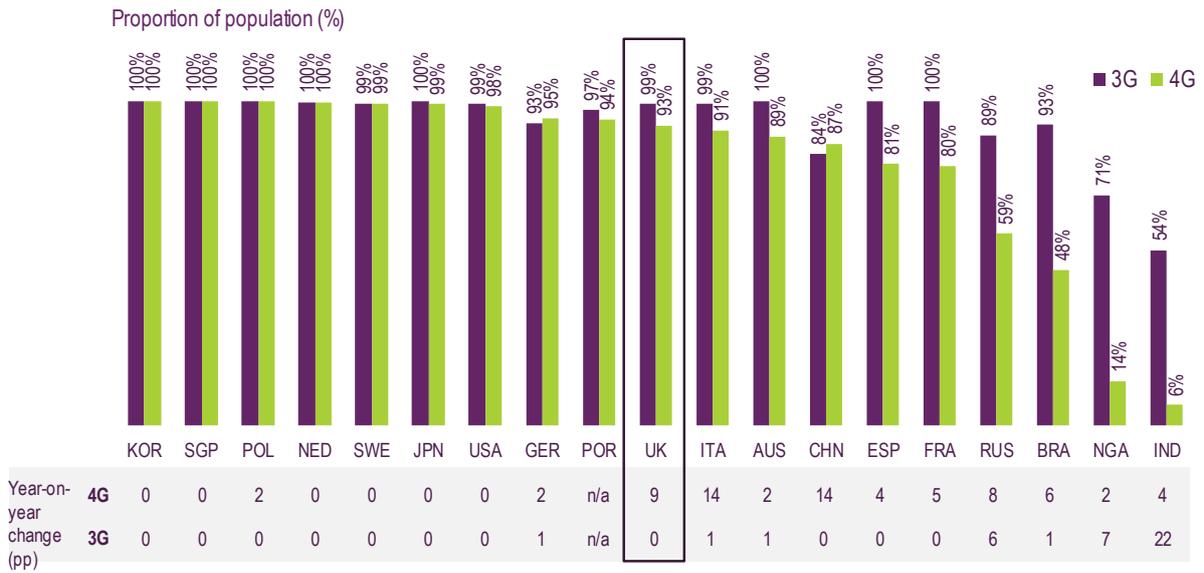
In 13 comparator countries, including the UK, 95% or more of the population was in areas served by 3G mobile broadband. All the countries with less than 95% coverage were developing markets, except for Germany¹⁰² (93%).

¹⁰⁰ In the *Key Market Developments* section **Error! Reference source not found.** of this chapter, the UK ranks ninth among 18 comparator countries.

¹⁰¹ In order to provide a comparative benchmark across all 19 countries, 4G (93%) and 3G (99%) mobile coverage in the UK encompasses outdoor coverage from at least one operator. This differs from the 4G (72.2%) and 3G (78.1%) coverage stated in our *Connected Nations 2016* report, which focuses on the percentage of premises that have indoor coverage from all operators.

¹⁰² Note that Germany's 3G coverage is likely to be understated as the country generally applies a more rigorous definition of mobile coverage, which is based on actual download speeds rather than simple reception of a signal.

Figure 3.35 Percentage of population in areas served by 3G and 4G mobile broadband: year-end 2015



Source: IHS

Note: NGA is the country code for Nigeria. All figures have been rounded to the nearest whole number. Data in this chart differs from the 4G (72.2%) and 3G (78.1%) coverage stated in our Connected Nations 2016 report, which focuses on the percentage of premises that have indoor coverage from all operators.

3.5.2 Take-up and use

Household penetration of fixed broadband reached 80% in the UK at the end of 2015

At the end of 2015, 88% of households in France subscribed to residential fixed broadband services,¹⁰³ the highest among the comparator countries for which figures were available, followed by 83% in South Korea. The UK ranked fifth at 80%, an increase of 3pp since 2014.

Figure 3.36 Household penetration of fixed broadband services: year-end 2015



Source: IHS

Note: Data for Portugal and Nigeria are not included in the comparison. All figures have been rounded to the nearest whole number.

The proportion of fixed broadband connections with a headline speed of 30Mbit/s or higher increased in all of the comparator countries in 2015

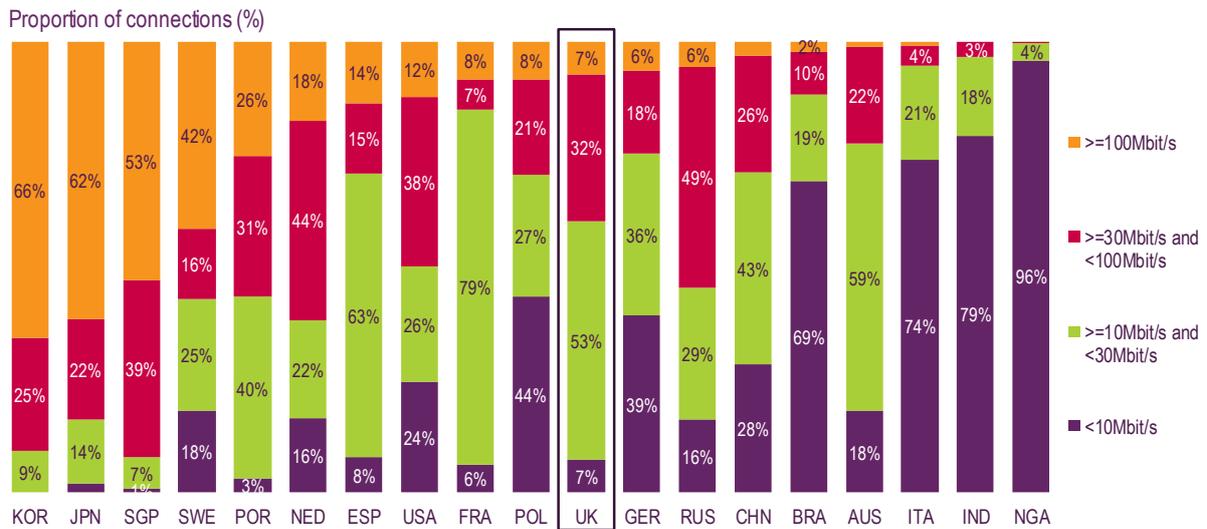
Singapore had the highest share of fixed broadband connections with advertised speed of 30Mbit/s or higher at the end of 2015, at 92, while Nigeria ranked lowest at 0.3%. The UK ranked ninth, with 40%¹⁰⁴ of connections having a headline speed of 'up to' 30Mbit/s or higher.

South Korea (66%), Japan (62%) and Singapore (53%) had the highest proportions of connections at headline speeds of 100Mbit/s or higher, due to the early introduction and high availability of fibre networks in these countries. This compares to 7% in the UK, an increase of one percentage point since year-end 2014.

¹⁰³ This metric represents the number of households that subscribe to residential fixed broadband services.

¹⁰⁴ This differs from the figure of 32.3% stated in our *Connected Nations 2016* report, which measures the maximum sync speed recorded which, in most cases, will be lower than the advertised speed.

Figure 3.37 Proportion of fixed broadband connections, by advertised speed: year-end 2015



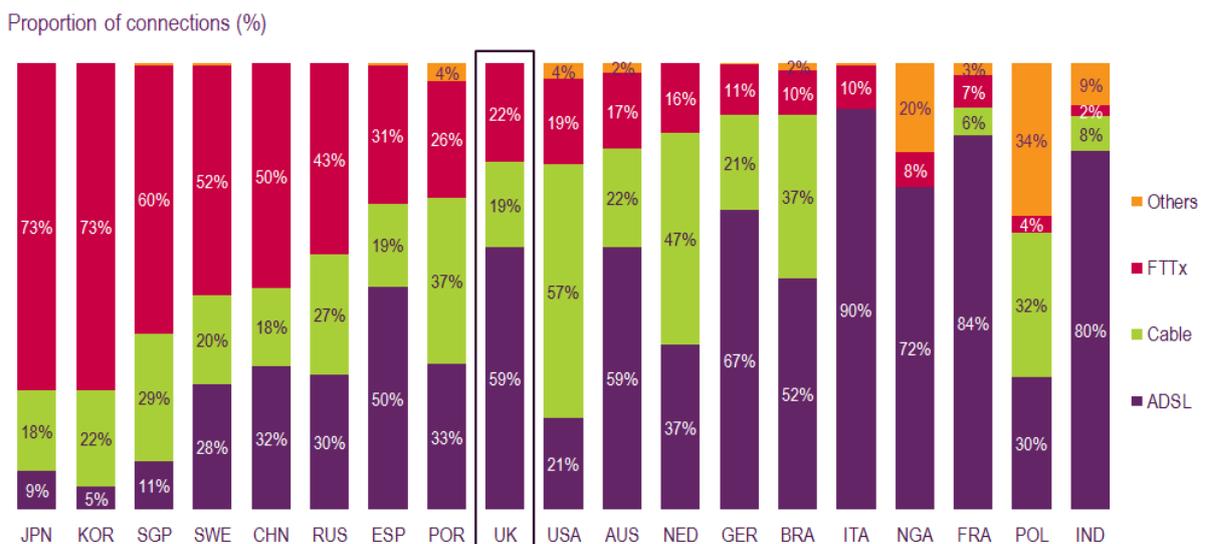
Source: IHS

Note: NGA is the country code for Nigeria, and does not refer to next generation access technologies. All figures have been rounded to the nearest whole number.

China was the fastest growing market for FTTx connections, which accounted for 50% of total fixed broadband connections in 2015

FTTx accounted for half or more of fixed broadband connections in five of our comparator countries at the end of 2015. The UK was ninth, at 22% FTTx connections, while FTTH/B accounted for just 0.3% of total fixed broadband connections. China was the fastest growing market (up 18pp since 2014), as China Telecom and China Unicom increased their focus on deployment of FTTB/H networks.

Figure 3.38 Percentage of fixed broadband connections, by technology: year-end 2015



Source: IHS

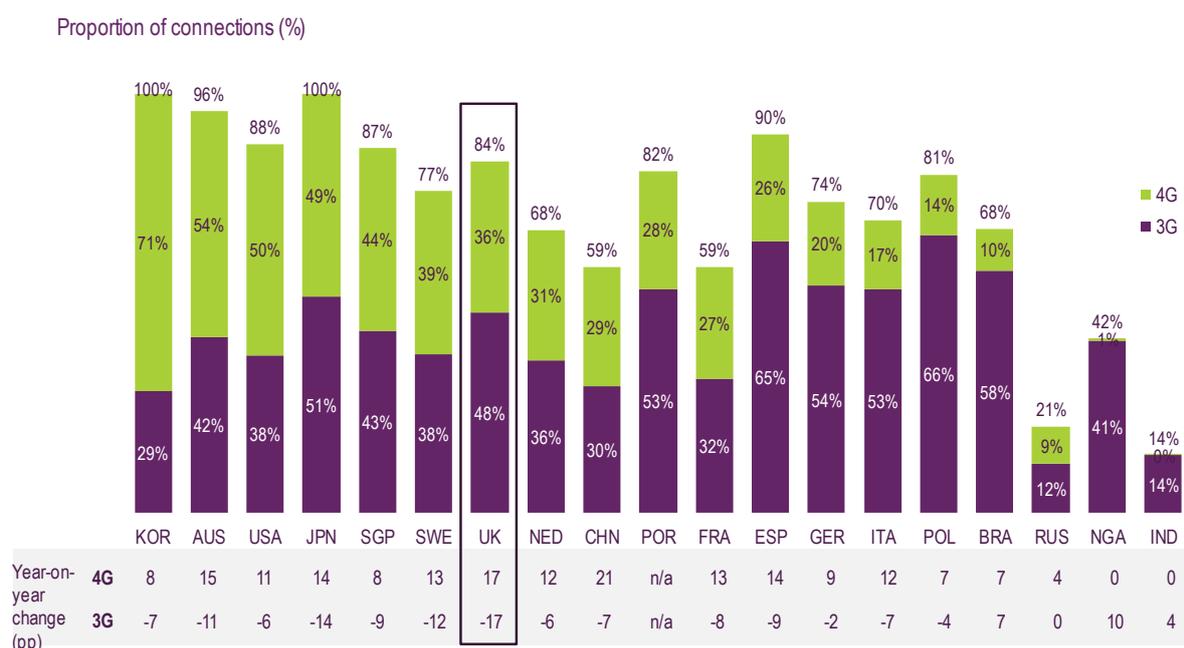
Note: NGA is the country code for Nigeria, and does not refer to next generation access technologies. All figures have been rounded to the nearest whole number.

In the UK, 4G connections accounted for 36% of total mobile connections at the end of 2015, a 17pp year on year increase

At the end of 2015, 4G mobile broadband connections accounted for at least 50% of total mobile connections (including M2M connections) in South Korea, Australia and the US. South Korea ranked first, with 71%, having migrated its remaining 2G connections onto 3G or 4G networks in 2015. Among our comparator countries, only Japan and South Korea had all their mobile connections on 3G or 4G networks.

The UK was seventh (36% of total UK mobile connections were 4G at the end of 2015), up by 17pp from year-end 2014. The increased availability of 4G networks and growing consumer appetite for mobile data has helped drive take-up of 4G services in the UK.

Figure 3.39 Percentage of 3G and 4G connections as a proportion of total mobile connections: year-end 2015



Source: IHS

Note: NGA is the country code for Nigeria. All figures have been rounded to the nearest whole number. The countries are ranked by 4G connections as a proportion of total mobile connections

Mobile broadband connections per 100 people increased in all of the comparator countries at the end of 2015

Singapore had the highest number of mobile broadband connections (aggregating 3G and 4G) per 100 people at 146, driven by high rates of multi-SIM and multi-device use. India had the fewest connections (11), due in part to the low levels of 3G and 4G availability, which is concentrated largely in urban areas. By comparison, the UK had 110 mobile broadband connections per 100 people, ranking eighth among our comparator countries.

The number of 4G mobile broadband connections per 100 people had increased in all comparator countries at the end of 2015. South Korea led this growth (83), while the UK ranked seventh (47). Poland had the most 3G connections per 100 people, at 97, while the UK fell from 84 3G connections per 100 people (year-end 2014) to 63, as customers migrated to 4G services.

Figure 3.40 Mobile broadband connections per 100 people: year-end 2015



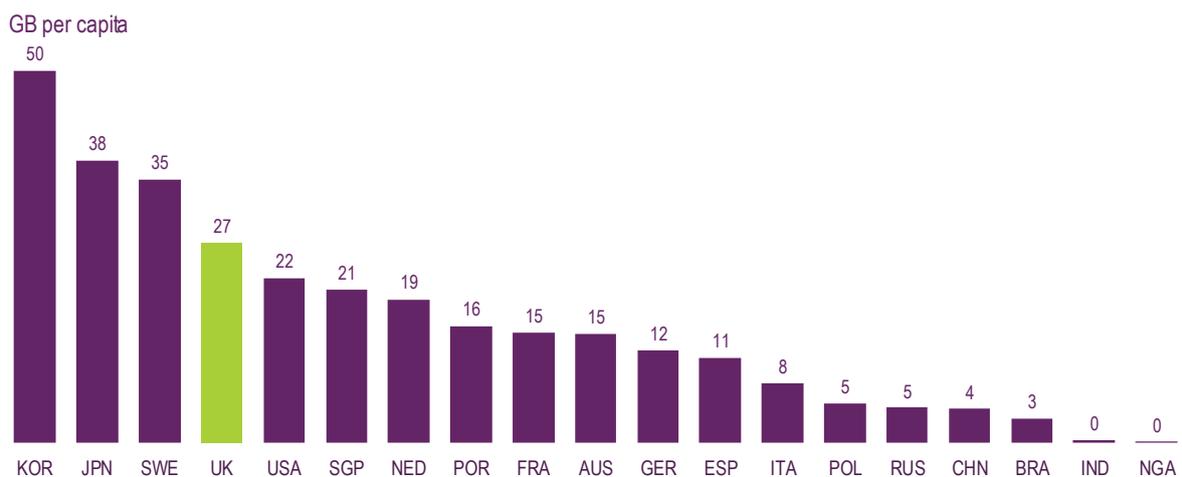
Source: IHS

Note: Mobile broadband includes all data connections made on cellular networks, including those made via mobile handsets and using dedicated mobile data dongles and SIMs. NGA is the country code for Nigeria. All figures have been rounded to the nearest whole number. The countries are ranked by 4G connections per 100 people.

The UK ranked fourth for fixed data volume consumption per head, at 27GB per month in 2015

With the increase in availability and adoption of fixed broadband, data traffic volumes grew in most of our comparator countries in 2015. South Korea had the highest fixed data volume per head, at 50GB per month. The UK was fourth, at 27GB, an increase of 5GB (from 22GB in 2014).

Figure 3.41 Fixed data volume per capita per month: 2015



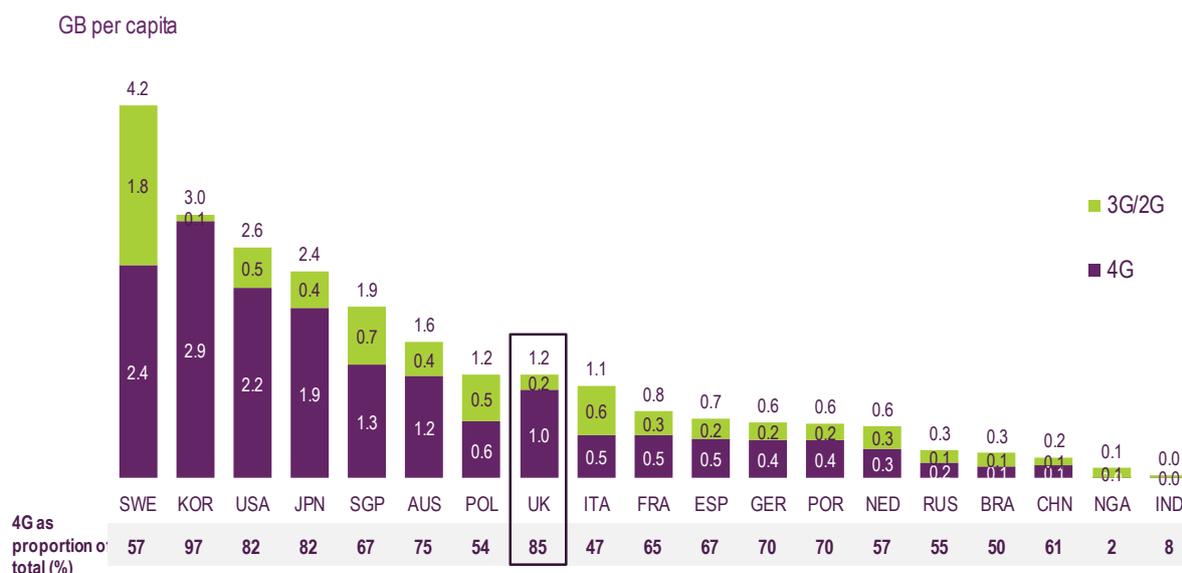
Source: IHS

Note: NGA is the country code for Nigeria. All figures have been rounded to the nearest whole number.

Mobile data volume per capita in the UK reached 1.2GB per month in 2015, an increase of 63% since 2014.

In the UK, the increasing adoption of smartphones, used by 72% of the respondents in the UK, and 4G services, has led to this growth in mobile data consumption, which reached 1.2GB per month in 2015, with 4G data accounting for 85% of total mobile data volume. Please see chapter 6 *Internet and online content* for further details on smartphone take-up among our comparator countries. Sweden had the highest mobile data volume per person, at 4.2GB per month, followed by South Korea at 3.0GB per month.

Figure 3.42 Mobile data volume per person per month: 2015



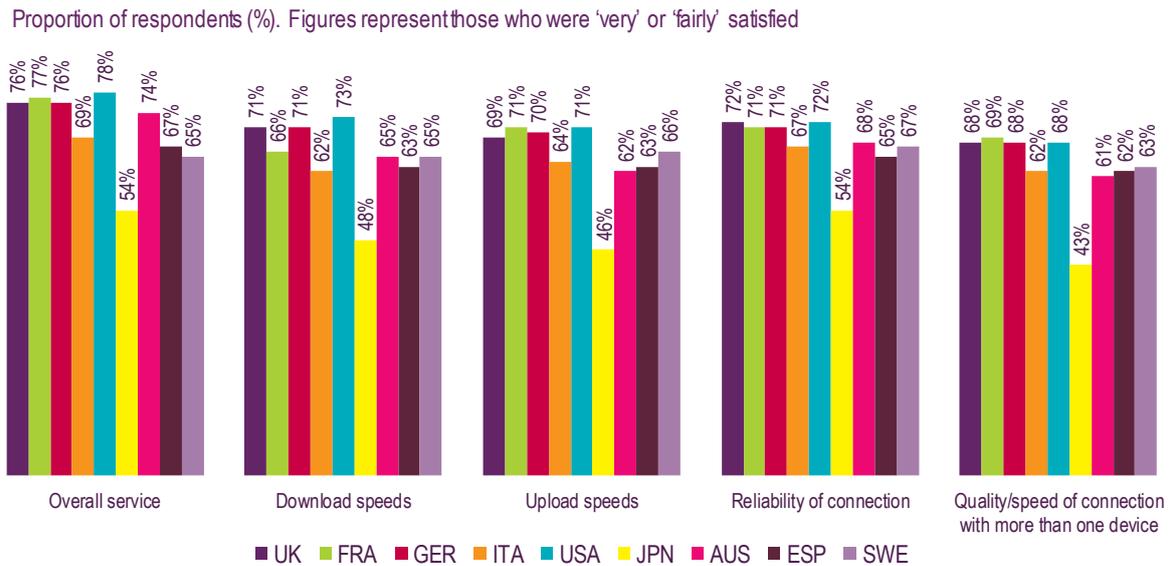
Source: IHS

Note: NGA is the country code for Nigeria

Of all our comparator countries, the UK and the US had the highest levels of satisfaction with reliability of household fixed broadband services

In the UK and the US, 72% of respondents were either 'very' or 'fairly' satisfied with the reliability of their fixed broadband connection in 2016. More than three-quarters of respondents in the UK were also satisfied with their overall fixed broadband service.

Figure 3.43 Satisfaction with fixed broadband service: 2016



Source: Ofcom consumer research 2016

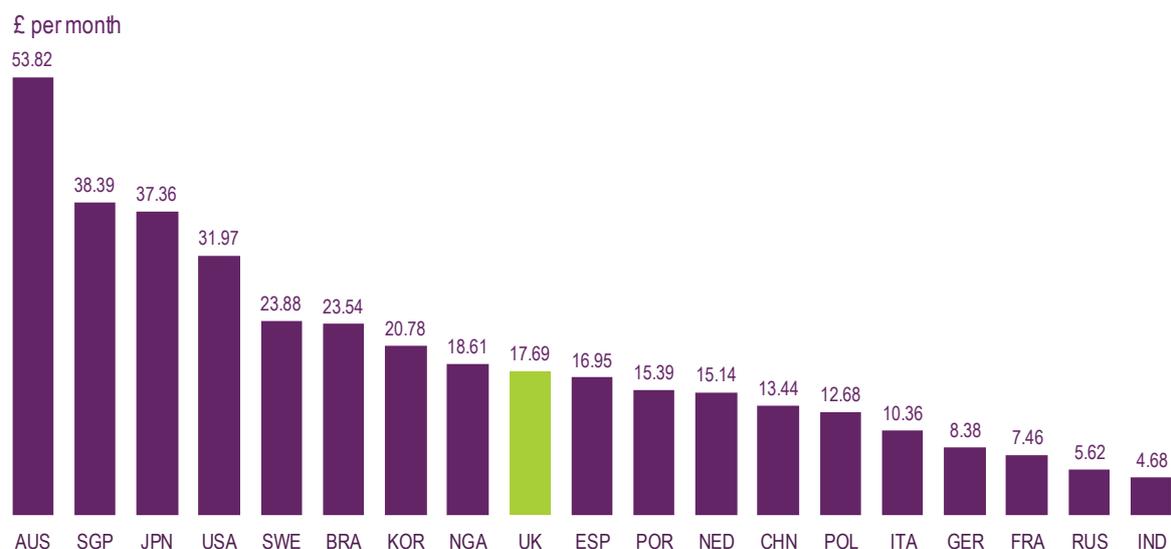
Base: All respondents who use the internet at least once a week, UK=744, FRA=786, GER=655, ITA=644, USA=531, JPN=513, AUS=656, ESP=679, SWE=701

Q.30 To what extent are you satisfied or dissatisfied with the following aspects of your current home broadband service? A: Very or fairly satisfied

Australia had the highest average fixed broadband revenue per connection, at £53.82 per month in 2015

Fixed broadband revenue per connection was highest in Australia in 2015, at £53.82 per month, followed by Singapore at £38.39. China had the largest increase in average revenue per connection, driven by an increase in the adoption of faster broadband services. The UK ranked ninth, at £17.69 in 2015.

Figure 3.44 Average monthly fixed broadband revenue per connection: 2015



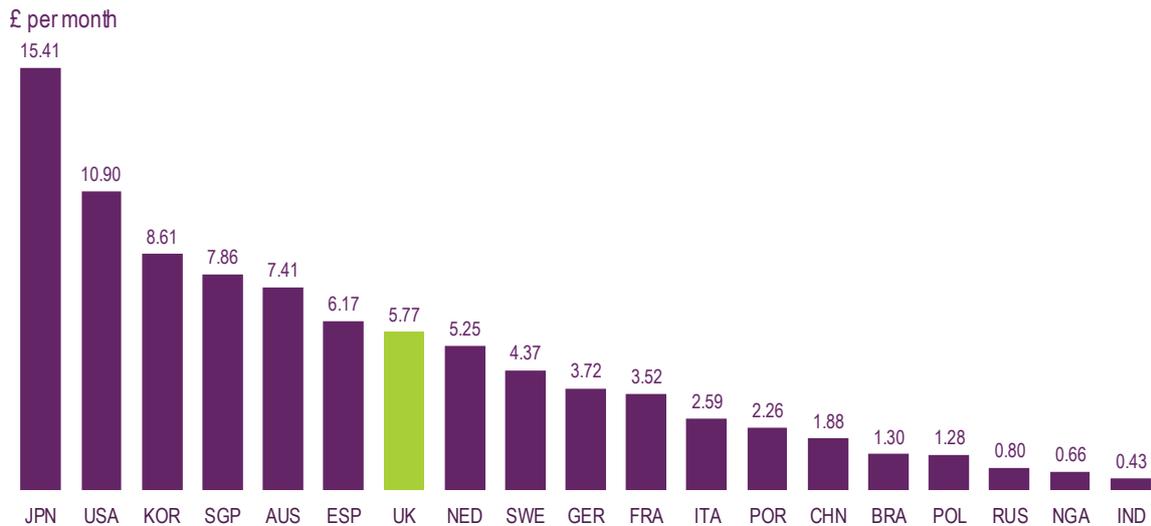
Source: IHS

Note: NGA is the country code for Nigeria, and does not refer to next generation access technologies.

Average monthly non-messaging mobile data revenue per mobile connection in the UK was £5.77 in 2015

In 2015, the average monthly non-messaging mobile data revenue per mobile connection ranged from £0.43 in India to £15.41 in Japan. The US and Japan were the only comparator countries where non-messaging mobile data revenues were more than £10 per connection per month. In the UK, the average monthly non-messaging mobile data revenue reached £5.77 in 2015, as more consumers migrated to 4G services and data consumption increased.

Figure 3.45 Average non-messaging mobile data revenue per mobile connection: 2015



Source: IHS

Note: NGA is the country code for Nigeria

Nigeria had the highest price per GB for fixed broadband data, at £1.34 in 2015

Price per GB of fixed broadband data is calculated using volume of fixed broadband data traffic and fixed broadband revenue. South Korea had the cheapest price for fixed broadband data, at £0.17, per GB, while Nigeria was the most expensive, at £1.34, of the comparator countries for which figures were available. Prices in many markets declined, although there were exceptions such as China, where the price increased by 8.2% to £0.56 in 2015, as more consumers migrated to FTTx services. The UK ranked fifth, at £0.26 per GB, a decline of 6.9% since 2014.

Figure 3.46 Price per unit for fixed broadband data consumption: 2015



Source: IHS

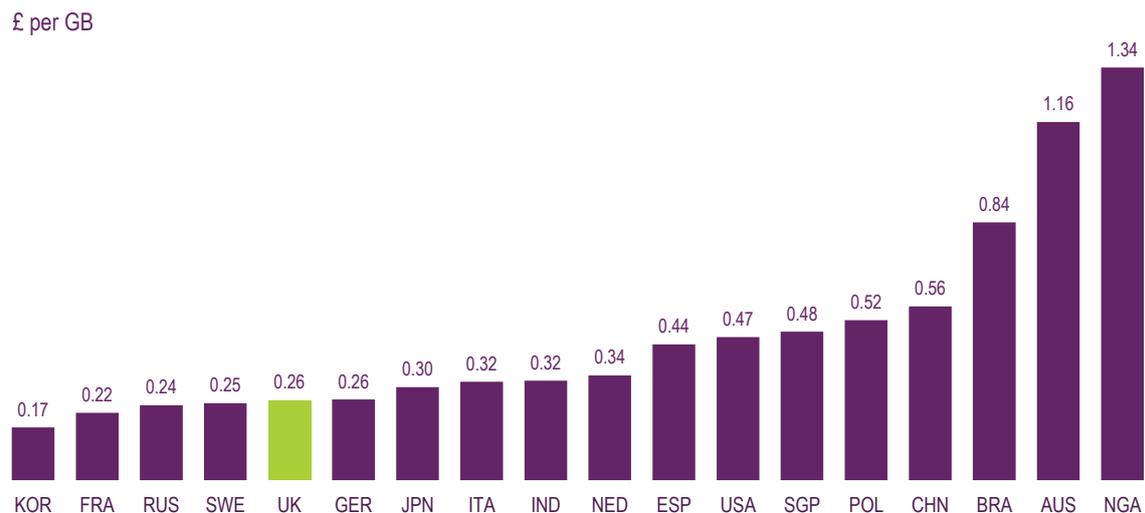
Note: NGA is the country code for Nigeria, and does not refer to next generation access technologies. Data for Portugal are not included in the comparison.

Price per GB for mobile data declined by 53% in the US, to £4.97 per GB in 2015

Price per GB of mobile data is calculated using the volume of mobile data traffic and mobile non-messaging data revenues. Price per GB for mobile data declined across all the countries for which figures were available, in part because providers continued to increase bundled data allowances to cater for the growing appetite for mobile data services.

The Netherlands had the highest price per unit for mobile data in 2015, at £12.77, although this price was 40% lower than in 2014 (£21.30). The UK ranked eleventh, with the price of mobile data declining by a third, to £6.68, in 2015.

Figure 3.47 Price per unit for mobile broadband data consumed: 2015



Source: IHS

Note: NGA is the country code for Nigeria.

3.5.3 Choice

To compare the amount of choice available to consumers in the fixed and mobile broadband markets, we have used some proxy measures of consumer choice. For the fixed broadband market, we have compared the percentage of fixed broadband subscriptions that the incumbent provides, while for the mobile broadband market, we have considered the market share of the largest mobile network operator (MNO) and the Herfindahl-Hirschman index of market concentration (HHI) in each country (Figure 3.50).

The proportion of retail fixed broadband lines operated by incumbents remains broadly stable

The incumbent fixed broadband providers in India (BSNL) and Australia (Telstra) operated the highest proportion of lines, at 54%, closely followed by the Italian incumbent (Telecom Italia) at 51% at the end of 2015. The US and Sweden were the only comparator countries in which the incumbent fixed broadband provider operated less than 25% of lines at the end of 2015. In the UK, incumbent provider BT operated 32% of fixed broadband lines, lower than that of the incumbent providers in all other EU5 markets and many other comparator countries. However, in 2016, BT completed the acquisition of EE, which has a small share of the fixed broadband market, so BT's overall retail share of fixed broadband lines is likely to increase.

Figure 3.48 Percentage of fixed broadband lines operated by incumbent: year-end 2015



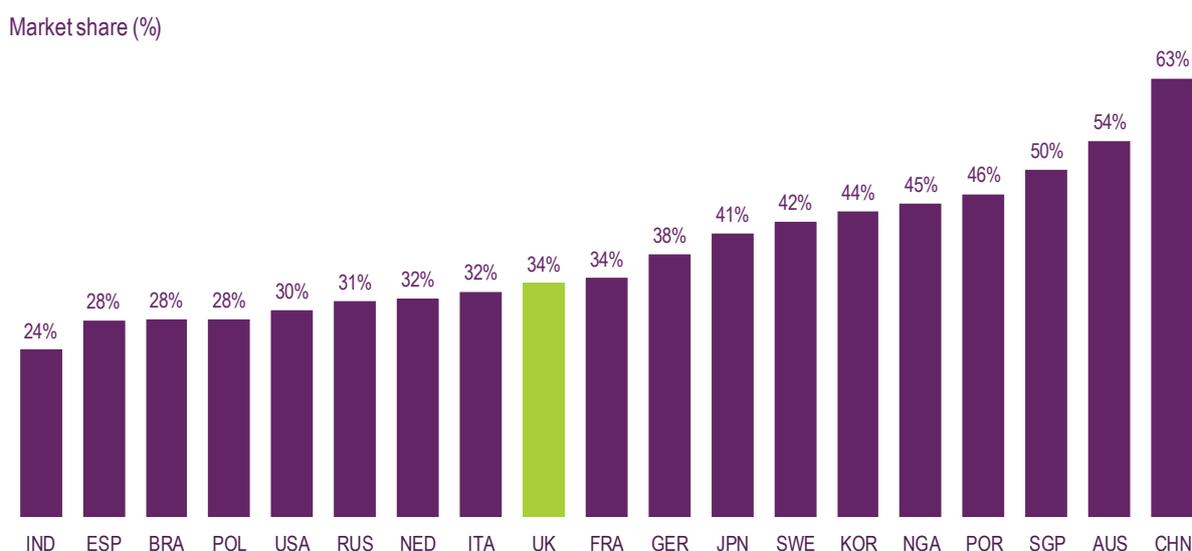
Source: IHS

Note: Data for Nigeria are not included in the comparison. All figures have been rounded to the nearest whole number.

China Mobile had the largest market share of any leading MNO in the comparator countries, at 63% at the end of 2015

Among the comparator countries, India was the only country where the leading MNO (Bharti Airtel) had less than 25% share of mobile connections at the end of 2015. China's leading MNO and the largest mobile operator in the world by number of connections, China Mobile, had a 63% share. The second most concentrated market was Australia, where Telstra had a 54% share, followed by Singapore, where SingTel had a 50% share. In the UK, the largest MNO, EE, had a 34% market share (including wholesale and hosted MVNO connections).

Figure 3.49 Percentage retail¹⁰⁵ market share of leading MNO: year-end 2015



Source: IHS

Note: NGA is the country code for Nigeria. All figures have been rounded to the nearest whole number.

China was the most concentrated market, with HHI of 4,679 in 2015, as the leading MNO held the biggest share of the market

We have used HHI in order to compare concentration in mobile markets.

This index is estimated by taking the absolute value of the market share of each firm in the industry (e.g. 25 if the market share is 25%) and then squaring this number. The sum of these values for all firms is the HHI, and can theoretically range from close to zero for a market with a large number of firms of equal size, to 10,000 for a monopoly. As the calculation is based on market shares for a specific period, even small changes of a few percentage points in market share can impact HHIs, thereby affecting the overall rankings.

In our sample of countries¹⁰⁶ China was the most concentrated MNO market in 2015, with an HHI of 4,679. This is a result of China Mobile's high share of mobile connections (63%) and only two competitors. In contrast, India had the lowest HHI (1,534), as the largest MNO in India, Bharti Airtel, only had a 24% subscriber share, with up to nine MNOs in some regions¹⁰⁷. However, in India, as well as in the US and Brazil, some MNOs have regional licences and do not compete at the national level. Given that the HHI below is based on national subscriber figures, concentration measurements at a geographic level are likely to be different for countries with regional mobile licences.

¹⁰⁵ In some comparator countries, the mobile connections used to calculate MNO market shares include wholesale and hosted MVNO connections.

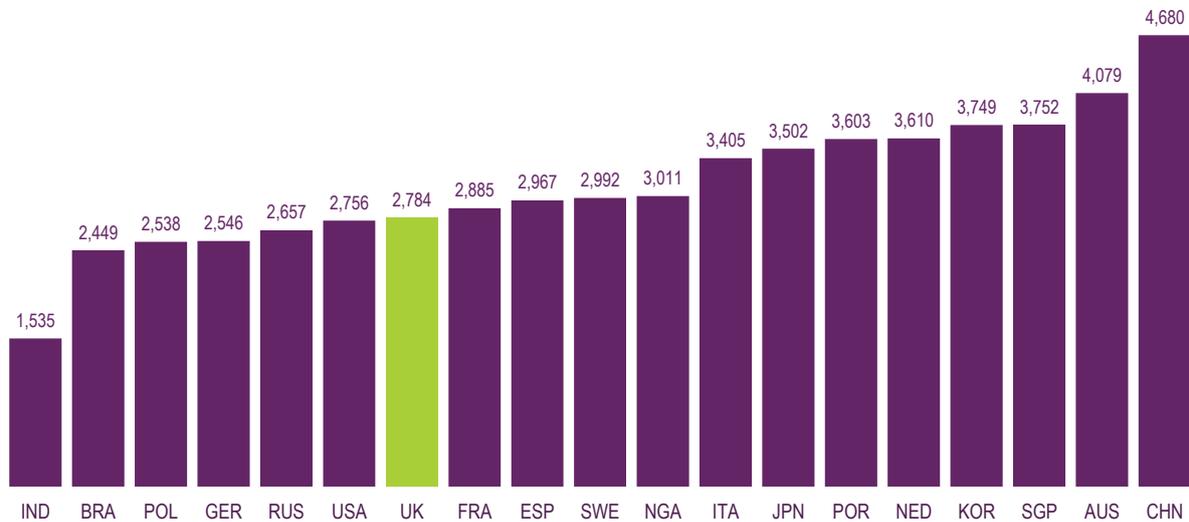
¹⁰⁶ The MNO market shares used for calculating these HHIs include wholesale and hosted MVNO shares.

¹⁰⁷ In India, the country is divided into 22 circles (i.e. regions), with licences being awarded on a per-circle basis. As a result, the number of active MNOs varies between different circles.

http://www.trai.gov.in/WriteReadData/PressRealease/Document/Press_Release_No.97_Eng_07_10_2016.pdf

In our comparison the UK ranked sixth with an HHI of 2,877;¹⁰⁸ a lower concentration index than Japan, South Korea and Germany but higher than the US and Russia, among others.

Figure 3.50 Mobile market HHI, MNOs (including wholesale and hosted MVNO): year-end 2015



Source: IHS

Note: NGA is the country code for Nigeria

¹⁰⁸ In November 2016 we published *Award of the 2.3 and 3.4 GHz spectrum bands: Competition issues and auction regulations* document. Here, the HHI indices were calculated using a different source for the market share data (Analysys Mason), covering a different set of countries. As a result, the estimated HHIs are different, especially for the Netherlands (3,495), France (2,788) and Sweden (2,859), with small differences for Italy (2,812), Spain (2,970) and the UK (2,869). See figure A6.22 of https://www.ofcom.org.uk/_data/assets/pdf_file/0026/93545/award-of-the-spectrum-bands-consultation.pdf