

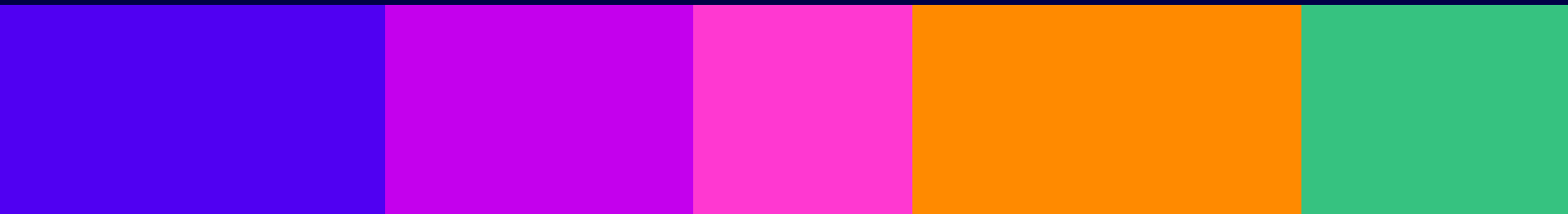


**Ofcom**

# Connected Nations

England Report 2023

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# Contents

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## Section

1. Overview.....	3
2. Fixed broadband and voice services .....	4
3. Mobile services .....	13

# 1. Overview

Ofcom's objective to make communications work for everyone includes encouraging reliable, widely available and high-quality networks. In this annual Connected Nations report for England, we measure progress on the availability of broadband and mobile services across England and the UK, including the newest full fibre, fixed wireless access and 5G networks now being rolled out.

Alongside this England report, we also publish separate reports on [broadband and mobile availability for the UK as a whole](#) and each of its other nations. Our [interactive dashboard](#) allows people to easily access data for different areas of the UK and in relation to specific services. In October 2023 we published an update on [Planned Network Deployments](#) for Very High Capacity networks in the UK for the next three years.

## What we have found

### Broadband

- **Full-fibre networks are now accessible at more than half of England's residential premises (56%),** a sharp increase from 41% last year.
- **Gigabit-capable broadband is now available at more than three-quarters (78%) of England's residential premises,** up from 71% last year.
- **Take-up of services on full-fibre networks has increased.** Take-up of services where full fibre is available, is around 27% in England. This is an increase of two percentage points from last year.
- **Superfast broadband coverage remains high and is available at 98% of residential premises in England.** Take-up of superfast broadband from fixed lines is now at 75% of premises where it is available in both England and in the UK as a whole.
- **The number of premises without access to decent broadband has fallen.** We estimate around 0.1% of all premises in England do not have access to decent broadband through a fixed line or fixed wireless connection.

### Mobile

- **4G mobile network coverage is broadly available.** Coverage for data services from at least one MNOs reaches 98% of England's landmass and 4G continues to carry the majority of mobile data traffic (accounting for 81% of total data traffic in the UK).
- **The availability of 5G services is growing rapidly.** In England, the percentage of premises that can now receive 5G outdoor coverage from at least one MNO ranges from 87% at the Very High Confidence level to 94% at the High Confidence level.<sup>1</sup> This constitutes 17 and 13 percentage point increases respectively, demonstrating the pace of rollout over the last year.

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<sup>1</sup> We consider High Confidence, associated with a signal strength (-110 dBm), to equate to at least an 80% confidence level, and Very High Confidence, associated with a higher signal strength (-100 dBm), to equate to a circa 95% confidence level.

## 2. Fixed broadband and voice services

### Introduction

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Full-fibre fixed networks are continuing to expand, bringing faster broadband and voice services to homes and businesses across England. In this section, we provide an update on the rollout of these networks over the last year and the take-up of services on these networks. We also present the latest data on the small remaining numbers of premises that still do not have access to decent broadband. Additionally, we give an update on the deployment of fixed wireless and satellite networks, that are delivering alternative forms of broadband connectivity.

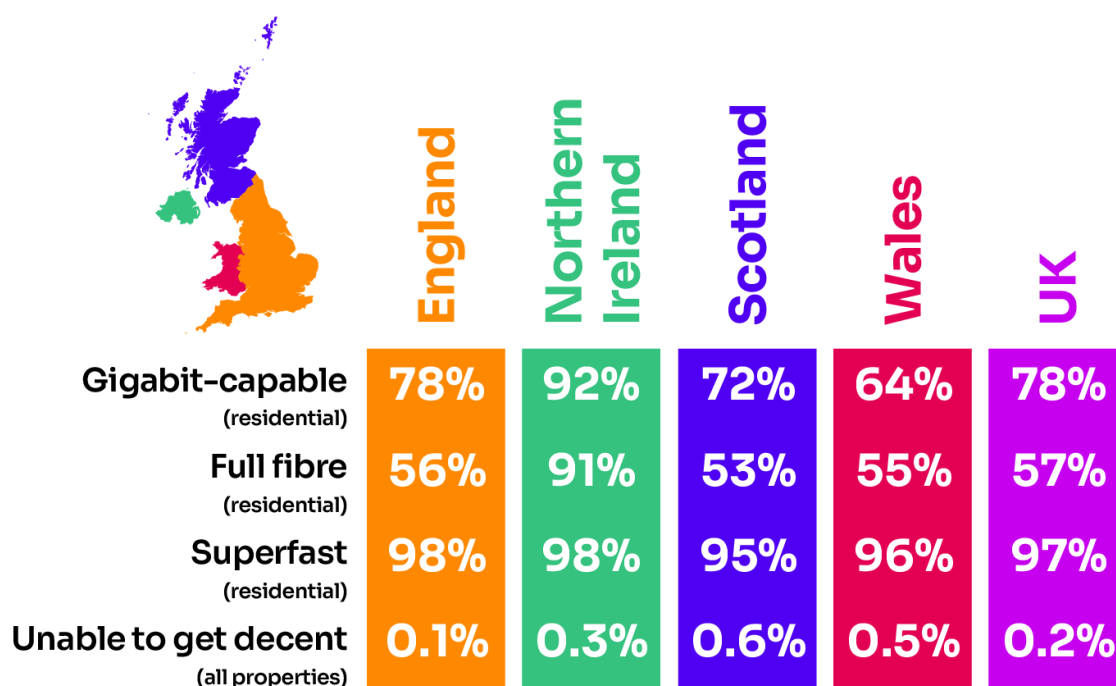
Growing connectivity across England and the rest of the UK is taking place in the context of broader changes to the fixed telecoms sector, including the migration to digital voice technology from the legacy public switched telephone network (PSTN). For more information on these developments, please refer to our [Connected Nations 2023 report](#) for the UK as whole.

#### Key highlights

- **Full-fibre coverage had its largest year-on-year increase to date**, with 14.1 million (56%) residential premises in England able to access a full-fibre connection in 2023 compared with 10.1 million (41%) in 2022.
- **Gigabit-capable coverage in England has continued to increase** and is now available to 19.6 million residential premises (78%) compared to 17.7 million (71%) in 2022, showing a seven percentage point increase over the last year.
- **Superfast coverage has remained at a consistently high level** and is currently available at 98% of residential properties across England. Take-up of superfast broadband from fixed lines is now at 75% of premises where it is available.
- **Take-up of services on full-fibre and gigabit-capable networks continues to grow.** Take-up of services using full-fibre networks where available, is around 27% in England. Take-up of services on gigabit-capable networks, where they are available, is now at 42% across the UK.
- **There are more broadband options delivered over wireless and satellite networks.** 96% of all premises in England have access to a fixed wireless access (FWA) service delivered over mobile networks and around 7% of all premises have coverage from WISPs. Nationwide low Earth orbit (LEO) satellite broadband coverage is now offered by Starlink.
- **The number of premises unable to access decent broadband has fallen, but around 33,000 of all premises in England still don't have access via either a fixed or wireless network.** This figure has decreased from around 40,000 in 2022 and 61,000 in 2021.
- **Consumers are moving from legacy voice services towards Voice over Internet Protocol (VoIP).** Around 1.5 million residential customers across the UK who had a PSTN line migrated to a VoIP service, with 38% (583,000 lines) due to managed migration. The remaining 62% (935,000 lines) were as a result of customer-initiated migrations.

## Fixed broadband coverage

Figure 2.1: Summary of broadband coverage at a fixed location across the UK and nations



Source: Ofcom analysis of operator data (September 2023).

Fixed broadband is available at a variety of speeds and is delivered over different technologies, including Asymmetric Digital Subscriber Line (ADSL), fibre to the cabinet (FTTC), hybrid fibre coaxial (HFC) cable, and full fibre which is also known as 'fibre to the premises' (FTTP). A detailed explanation of these technologies and speeds can be found in our [Connected Nations UK report](#).

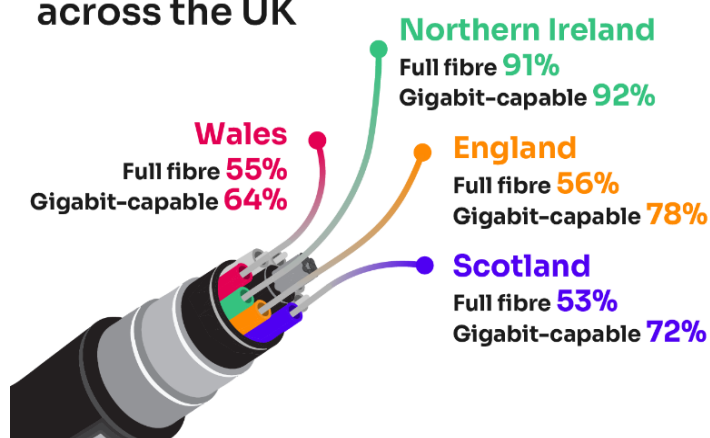
### Coverage of full-fibre and gigabit-capable broadband in England continues to grow

14.1 million (56%) residential premises in England are now able to access a full-fibre connection, which is an increase of 15 percentage points from last year. This constitutes the largest year-on-year increase in full-fibre coverage to date. The gap between urban and rural full-fibre coverage (59% of urban residential premises versus 42% of rural) is significant but smaller than for gigabit-capable coverage.

Gigabit-capable coverage in England has also continued to increase and is now available to 19.6 million residential premises (78%) compared to 17.7 million (71%) in 2022. Gigabit-capable includes full-fibre networks, as well as upgraded cable networks that can deliver download speeds of 1 Gbit/s or higher.

Gigabit-capable broadband is available to 83% of urban residential premises, compared to only 45% of rural premises. This gap between urban and rural coverage levels is mirrored across the other UK nations (with the exception of Northern Ireland where coverage is consistently high across both urban and rural areas) and indicates that consumers in rural areas are still less likely to be able to access the fastest broadband speeds. This can be partly attributed to the fact that deploying broadband infrastructure in urban areas is generally easier and faster due to the density of premises, whereas rural areas typically have more difficult and sparsely populated deployment environments.

## Gigabit-capable and full-fibre broadband coverage across the UK



**Table 2.1: Residential coverage of full-fibre and gigabit-capable broadband, urban/rural breakdown**

	Full fibre		Gigabit capable	
	2022	2023	2022	2023
<b>England</b>	<b>10.1m (41%)</b>	<b>14.1m (56%)</b>	<b>17.6m (71%)</b>	<b>19.6m (78%)</b>
<b>Urban</b>	9m (42%)	12.7m (59%)	16.5m (76%)	18.2m (83%)
<b>Rural</b>	1.1m (34%)	1.3m (42%)	1.1m (37%)	1.4m (45%)
<b>United Kingdom</b>	<b>12.4m (42%)</b>	<b>17.1m (57%)</b>	<b>20.8m (70%)</b>	<b>23.2m (78%)</b>
<b>Urban</b>	11m (43%)	15.2m (59%)	19.3m (76%)	21.3m (83%)
<b>Rural</b>	1.4m (35%)	1.8m (43%)	1.5m (37%)	1.9m (45%)

Source: Ofcom analysis of operator data (September 2023).

## Both private and public sector investment is driving the rollout of faster networks

Data collected from the UK’s largest network operators suggest that UK telecoms operators invested £7.9bn in fixed telecoms network infrastructure in 2022, a £0.1bn (1%) increase in real terms compared to 2021.

The increase in gigabit-capable and full-fibre broadband is mainly driven by deployments from the larger fibre operators (Openreach, Virgin Media O2 and CityFibre). Several smaller operators are also playing an important part in the roll-out of gigabit-capable broadband.

For example, WightFibre operates only on the Isle of Wight and has a stated objective to create the UK's first 'Gigabit Island'. The company completed the migration of legacy cable network customers to a new full-fibre network in 2021 and switched off its HFC-based cable network in [August 2022](#). In August 2023, WightFibre [announced](#) that its Gigabit Island Project was nearing completion, with 57,000 premises on the Isle of Wight having access to its full-fibre broadband service and over 560 km of trenches dug out of an expected total of 600 km.

There are also examples of local initiatives taking place to solve connectivity issues in rural areas. For example, Broadband for the Rural North (B4RN) is a registered Community Benefits Society that has been working with volunteers since 2011 to roll out a 10 Gbit/s FTTP broadband network across rural parts of England. In July 2023, it [announced](#) its intention to upgrade its core network to 400 Gbit/s to make it future proof by 2030.

Publicly funded UK Government initiatives continue to supplement commercial rollout. The UK Government has [committed to](#) achieving 85% gigabit coverage across the UK by 2025, with the ambition to reach at least 99% of premises by 2030. In 2022, as part of its Project Gigabit programme, the UK Government agreed contracts with operators to improve connectivity in rural areas in North Dorset, Teesdale, Northumberland and Cumbria. In 2023, it built on this by awarding [further contracts](#) to operators in Cornwall, Cambridgeshire, New Forest, North Shropshire, Norfolk, Suffolk and Hampshire.

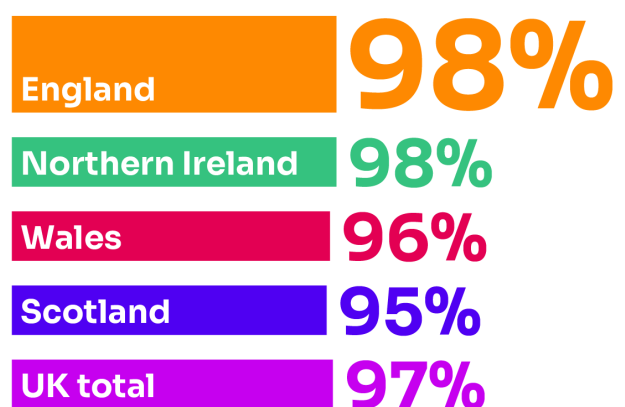
The UK Government also supports rollout through schemes such as the Gigabit Broadband Voucher Scheme (GBVS), which provides vouchers worth up to £4,500 to individual eligible customers to contribute towards the installation costs of gigabit-capable broadband. As of September 2023, the government [announced](#) that more than 100,000 vouchers had been used to connect premises to gigabit-capable broadband under the scheme, with a further 21,800 vouchers issued but not yet used.

## Almost all residential premises in England have access to a superfast broadband connection

Superfast broadband describes any service that can provide a download speed of 30 Mbit/s or more. Superfast coverage has remained at a consistently high level in recent years and currently totals at 98% of residential properties across in England and 97% in the UK in 2023. This figure has remained stable for the UK and has increased by one percentage point for England since 2022.

As operators focus increasingly on delivering gigabit-capable services, we expect any future increase in superfast coverage to be modest. This is also due to difficulties reaching the final 2-3% of properties, although publicly funded schemes may reach some of these premises.

### Superfast broadband coverage across the UK



**Table 2.2: Coverage of residential superfast broadband, urban/rural breakdown**

	England	UK
Urban	99%	99%
Rural	89%	88%
Total	98%	97%

Source: Ofcom analysis of operator data (September 2023).

There are still a small number of local authorities that have considerably lower levels of superfast coverage. For example, the City of London has the lowest level of superfast coverage in England (80%). This may reflect the relatively low number of residential properties and the prevalence of commercial leased lines in buildings, leading to a lower incentive for operators to deploy residential superfast broadband.

The next four local authorities in England with the lowest superfast broadband coverage are all rural areas in Devon: West Devon (84%), Mid Devon (84%), Torridge (85%), and South Hams (87%).

## **Broadband services provided by wireless networks and satellites are increasingly available across England**

Some premises may have access to broadband provided over a wireless network (known as fixed wireless access, or FWA), using either the mobile network or a wireless internet service provider (WISP). This can be an effective alternative in areas where a decent broadband service provided via a fixed connection is not yet available, which we estimate affects around 1% of all premises in England.

Based on coverage information from mobile network operators (MNOs), we estimate that 96% of residential premises in England have access to an MNO FWA service. We also estimate that around 7% of residential premises have coverage from a WISP network. We therefore estimate a significant proportion of those premises that do not have access to a decent broadband service via a fixed line connection could have access via an FWA network.

In addition, services arising from low Earth orbit (LEO) satellite constellations are developing their presence in the UK retail and business broadband markets in England. The technology for delivering satellite broadband has evolved significantly in recent years and it could be a potential solution for parts of the UK that struggle to gain connectivity through traditional technologies.

Starlink is currently the only direct-to-consumer LEO satellite broadband service in the UK. These services are currently more expensive than traditional broadband services (Starlink's 'Standard' broadband package is currently priced at £75 a month, with hardware options priced from £449<sup>2</sup>) but may offer an alternative option for some customers in hard-to-reach rural areas, who would otherwise face very high costs to install a traditional fixed broadband connection.

The data provided to us by Starlink indicates that over 42,000 connections (up from 13,000 last year) in the UK currently make use of LEO satellites for their broadband service. This includes both residential and business packages, and our analysis of Starlink customer connections suggests that:

- the majority of these customers are in rural areas.

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<sup>2</sup> For information on the residential service, see [Starlink for homes](#).



- 2-6% of these premises are in areas with no decent broadband, compared to 0.2% of premises in UK overall with no decent broadband.
- 15-20% of these premises have access to full fibre.

Relative to UK premises as whole, premises with a Starlink satellite broadband connection are therefore more likely to be in a rural area, and less likely to have access to a decent fixed line or FWA broadband service.

The UK Government has also been exploring the potential of satellite broadband. In November 2022, it [announced](#) a series of LEO satellite broadband trials in remote areas around the UK, including in Rievaulx Abbey in North Yorkshire Moors National Park and Wasdale Head in the Lake District. This has since been [extended](#) in 2023 to include Lundy Island off the coast of North Devon. These trials were initially supported by Starlink and now also by [OneWeb](#). In October 2023, the UK Government also [announced](#) it was seeking views as part of a consultation on improving broadband for Very Hard to Reach premises.

Additionally, in August 2023 the UK Government [announced proposals](#) for a Connectivity in Low Earth Orbit scheme (CLEO), with the goal of providing UK researchers and businesses with critical support to drive the development of new constellations.

## A small proportion of residential and commercial premises remain unable to access decent broadband

Our latest estimate is that around 33,000 residential and commercial premises in the England still do not have access to a decent broadband service via either a fixed or wireless network.

This figure has decreased from around 40,000 in 2022, and 61,000 in 2021. This reduction is likely due to a combination of factors, including sustained levels of private investment; the increased number of smaller fibre network and FWA providers from which we have gathered data; and the continued rollout of some publicly funded schemes.

Some of the 33,000 premises may be able to have a new connection built under the broadband universal service obligation (USO), which provides everybody with the

right to request a broadband connection with a download speed of at least 10 Mbit/s and an upload speed of 1 Mbit/s (as well as a number of other specific technical characteristics). Where an affordable connection (defined by Ofcom as £54 or less a month)<sup>3</sup> with these characteristics is not available, and not due to become available in the next 12 months under a publicly funded scheme, the customer is eligible for the USO (if the costs of providing the connection are below £3,400 or, where the costs are above £3,400, the customer agrees to pay the excess).<sup>4</sup> In October 2023, the Government [announced](#) it would be seeking views on a review of the USO and if any changes to it are required to keep it up to date with current technical standards.

### Number of premises in England without a decent broadband connection from a fixed or FWA service



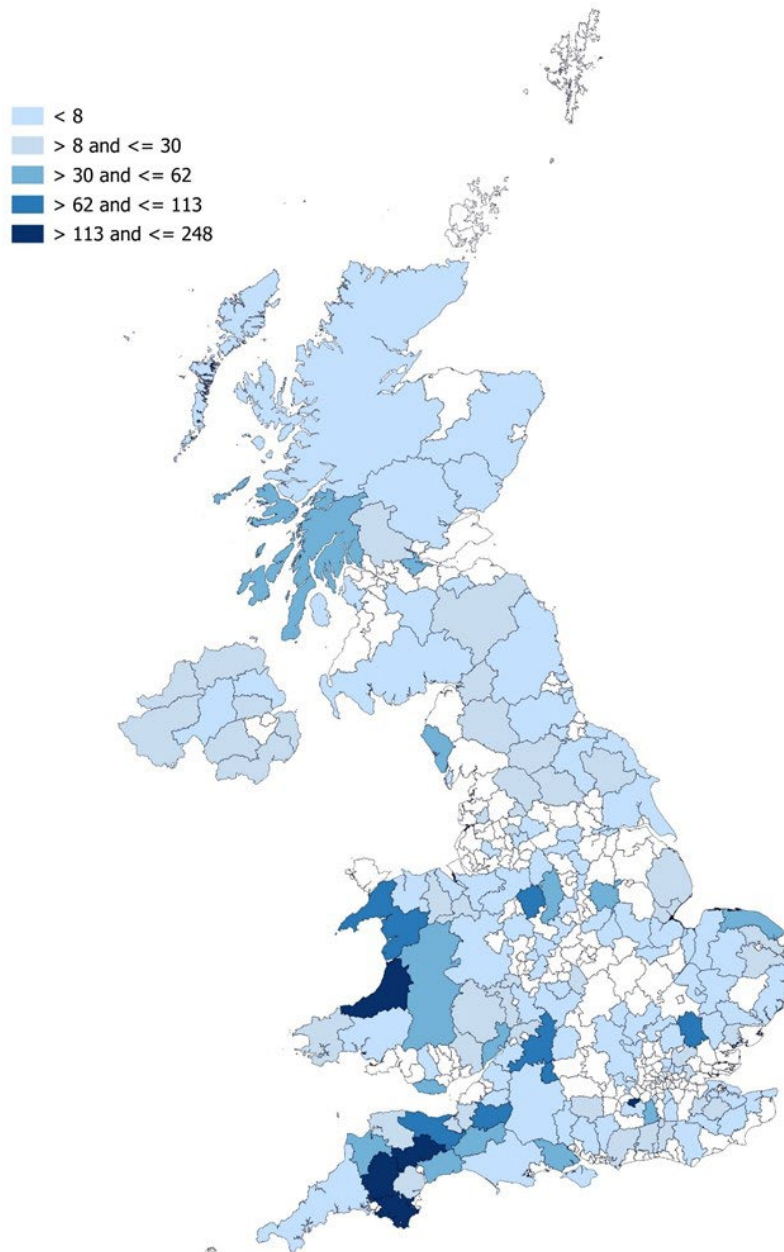
<sup>3</sup> Ofcom, [Your right to request a decent broadband service: What you need to know](#), 8 August 2023.

<sup>4</sup> In calculating whether the costs are below or above £3,400, the universal service provider (USP) must take into account where costs could be shared by several USO eligible premises.

BT is the universal service provider (USP) for the UK (apart from in the Hull area), and KCOM is the main provider for the Hull area. As the USPs for these respective areas, BT and KCOM are required to provide the USO and to [report](#) at six monthly intervals on delivery. As of October this year, BT has received approximately 2,000 orders, of which 1,529 are in England.<sup>5</sup>

The map below shows that the USO has delivered connections across the UK, with certain areas in South-West England receiving a high number of connections.

**Figure 2.2: Map of USO premises passed by Local Authority Area (per 100,000 premises)**



*Source: Ofcom analysis of BT data (September 2023) using 2021 Local Authority boundaries.*

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<sup>5</sup> While conducting final accuracy checks for the purpose of our report, BT informed us that the implementation of a new data model might have impacted on their reporting of total USO orders and premises passed by resulting build. We are following this up with BT and will publish corrected data if necessary.

Not everyone is able to access a connection via the USO as there will be some premises where the cost to connect them will exceed the £3,400 threshold. In these cases, the excess cost quote may be too high for the customer to be able to pay. Alternative solutions may need to be explored for these premises where the excess is prohibitively high. In October 2023, the Government [announced](#) it would be seeking views on a review of the USO and if any changes to it are required to keep it up to date with current technical standards.

## Consumer take-up and use of fixed broadband connections

### Take-up of services on full-fibre and gigabit-capable networks continues to grow

We estimate that the take-up of services using full-fibre networks, where they are available, is around 27% in England. This is an increase of two percentage points in the 12 months to May 2023.

Of the top five local authorities with the highest levels of full-fibre take-up where it is available, four are in England - Kingston upon Hull (64%), Test Valley (59%), City of London (57%) and Cornwall (55%). Meanwhile, full-fibre take-up as a percentage of full-fibre coverage in England in rural areas (50%) is around double the levels in urban areas (24%).

While full-fibre take-up levels in England are continuing to rise steadily, they are significantly behind coverage levels and, as we discuss further in the [Connected Nations UK report](#), take-up levels vary considerably at local authority level. Variations in take-up level could be attributed to several factors such as the length of time that full fibre has been available in a particular area and the type of technology available to consumers in their area before full fibre was deployed (such as whether or not superfast broadband was present or not).

**Table 2.3: Estimated take-up of services on full-fibre networks as a percentage of premises where full-fibre networks are available: 2022 and 2023**

	2022	2023
<b>UK</b>	25%	28%
<b>England</b>	25%	27%

Source: Ofcom analysis of operator data (September 2023).

We estimate that take-up of services on gigabit-capable networks, where they are available, is now at 42% across the UK - meaning that more than two in five of all premises that have access to faster networks are using them. This is an increase of four percentage points from last year when take-up was at 38%.

### Take-up of superfast broadband has risen further

For homes in England that can access superfast broadband, around 75% of them do so. This is a two percentage point increase from around 73% last year.

Take-up of superfast broadband increased in all four nations in the 12 months up to May 2023. England remains the nation with the highest take-up of superfast broadband.

**Table 2.4: Estimated superfast take-up as a percentage of premises where superfast services are available: 2022 and 2023**

	2022	2023
UK	73%	75%
England	73%	75%

Source: Ofcom analysis of operator data (September 2023).

## The migration of the UK’s telephony network to digital continues

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The UK’s traditional landline services continue to undergo a significant transition as network operators retire their legacy systems (referred to as the public switched telephone network, or ‘PSTN’) and replace them with a digital technology called Voice over Internet Protocol (VoIP).

BT and Openreach aim to retire BT’s PSTN network and the Openreach wholesale services that deliver PSTN by the end of 2025, with Virgin Media O2 working on a broadly similar timescale. As of September 2023, Openreach has taken an important step in the PSTN switch-off by [stopping new sales](#) of the wholesale services delivering the PSTN across the UK.

Some operators (BT, Virgin Media O2 and Vodafone) have been migrating some of their existing customers on to VoIP; this practice is known as operator-led or managed migrations. According to data supplied to Ofcom by providers, in the year up to August 2023, around 1.5 million residential customers across the UK who had a PSTN line migrated to a VoIP service, with 38% (583,000 lines) as a result of a managed migration.<sup>6</sup> The remaining 62% (935,000 lines) were as a result of customer-initiated migrations.

BT paused its managed migrations programme in March 2022 and restarted it in April 2023 with a [trial](#) of ‘easier to migrate’ customers who have low landline usage and no additional needs. In the summer of 2023, BT started a regional rollout of migrations across the UK, focusing its engagement and communications activity in each region in turn. In England, it has [started](#) with customers in including the East Midlands and Yorkshire and the Humber, before turning its attention to London and the North West.

For more detail on the progress of this transition across the UK, refer to section 2 of our [UK-wide report](#).

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<sup>6</sup> The data we collect on migration only captures customers that migrate from PSTN to VoIP with the same operator (excluding those that switch from a PSTN service with one operator, to a VoIP service with another operator and consequently migrate to VoIP simultaneously). Therefore, we may underestimate the number of migrations that have occurred and may overestimate the proportion that occur as a result of a managed migration.

# 3. Mobile services

## Introduction

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In an increasingly interconnected world, mobile services continue to play an integral role in our daily lives, whether enabling seamless communication on the go, providing internet access, or powering wireless connectivity for devices like smart meters.

In this section, we look at the availability of mobile coverage outside and inside premises across England; the progress of 5G rollout in the last year, and investment in and use of mobile services.

As with [last year's Connected Nations England report](#), we report on the 5G coverage of individual mobile network operators (MNOs) across the UK, and in each of the UK nations. Our approach to reporting on 5G coverage is set out in more detail in our Connected Nations UK Report. For an explanation of how we calculate these coverage figures using data supplied to us by the MNOs, see the [Methodology annex](#) of our UK report.

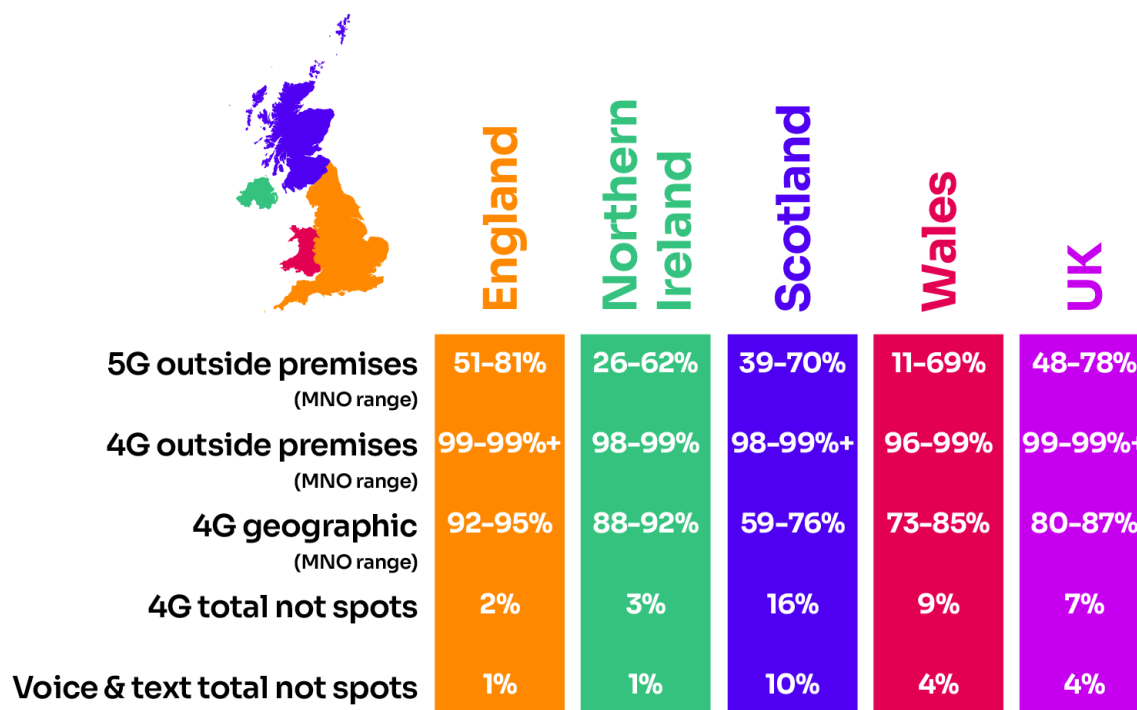
### Key highlights

- **The availability of mobile 5G non-standalone continues to grow rapidly.** The level of coverage provided outside of premises in England by at least one MNO has risen from 70-81% in 2022 (across a range covering Very High and High Confidence) to 87-94% in 2023.
- **4G continues to provide the backbone of mobile experience for consumers.** Coverage for data services from at least one MNO reached 98% of England's landmass and 4G continues to carry the majority of mobile data traffic (accounting for 81% of total data traffic in the UK).
- **There continues to be good coverage across the road network,** with 4G coverage in England predicted to be present in vehicles from all MNOs across 75% of major roads, with individual MNO coverage ranging from 89-92% for this metric.
- **MNOs have started switching off their 3G networks** and have committed to switching off their 2G networks by 2033 at the latest.
- **Mobile traffic continues to grow,** with overall traffic levels increasing by around 25% year on year, compared with a c.27% rise between 2021 and 2022. England carried the highest level of traffic at 85.3% (772 PB)<sup>7</sup> of all monthly data traffic, a slight increase from 2022 when it carried 84.8% (615 PB).

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<sup>7</sup> 1 PB (Petabyte) is equivalent to 1,000,000 GB (Gigabyte).

Figure 3.1: Summary of mobile coverage across the UK and nations



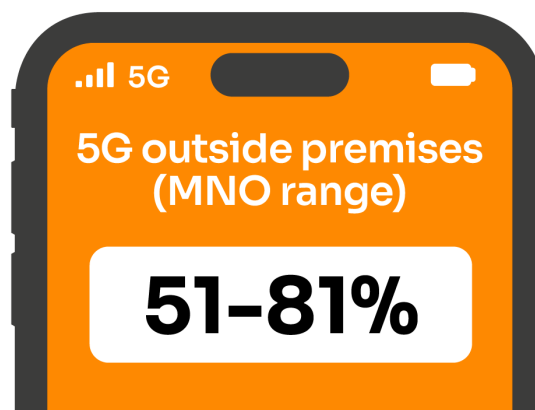
Source: Ofcom analysis of operator data (September 2023).

## Outdoor, indoor and geographic mobile coverage

### 5G and 4G coverage outside premises in England

Outdoor premises coverage refers to the predicted availability of mobile coverage in the vicinity of premises. Outdoor 5G premises coverage in England from all the MNOs is the highest of the four nations of the UK at 17-27%.

In England, we estimate that the percentage of premises that can now receive 5G outdoor coverage from at least one MNO ranges from 87% at the Very High Confidence level to 94% at the High Confidence level.<sup>8</sup> This constitutes 17 and 13 percentage point increases respectively, demonstrating the pace of rollout over the last year. These figures broadly mirror the UK-wide averages (85% Very High Confidence, 93% High Confidence). This coverage increase has been driven by additional 5G deployments,

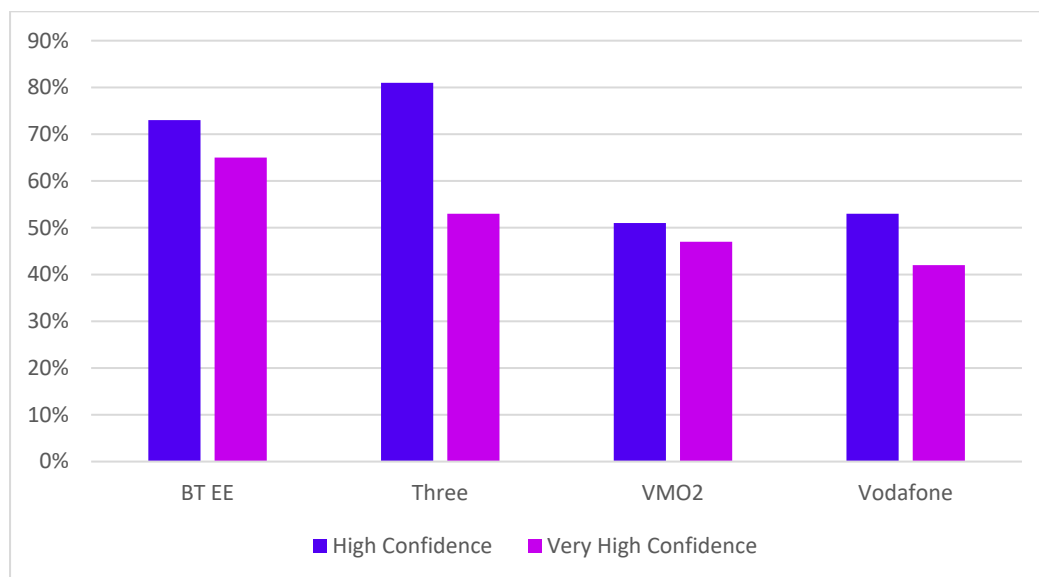


<sup>8</sup> We consider a High Confidence, associated with a signal strength (-110 dBm), to equate to at least an 80% confidence level, and a Very High Confidence, associated with a higher signal strength (-100 dBm), to equate to a circa 95% confidence level.

with more than 18,500 deployments in place across around 81,000 sites in the UK, up from around 12,000 5G deployments reported in 2022. Of these, 86% of 5G masts are in England.

5G coverage from individual MNOs is broadly in line with, or slightly above, the UK coverage levels reported in our Connected Nations UK report. The range of individual MNOs’ 5G coverage outside premises - from the MNO with the least coverage to the MNO with the most - is 51-81% for England (all based on our High Confidence level). More detail is shown in Figure 3.2.

**Figure 3.2: 5G coverage outside of England premises by MNO, at High Confidence and Very High Confidence levels**



Source: Ofcom analysis of MNO predictions (September 2023).

Meanwhile, turning to 4G coverage, nearly all premises in England are predicted to have outdoor 4G coverage from at least one MNO, and 99% are predicted to receive service from all four operators. There continues to be a slight difference between rural and urban areas, as only 91% of rural areas in England were able to receive outdoor coverage from all four MNOs. This is a one percentage point increase from 2022.

**Table 3.1: Outdoor 4G coverage from all four MNOs, urban/rural breakdown**

	2022	2023
<b>England</b>	<b>98%</b>	<b>99%</b>
<b>Urban</b>	99%+	100%
<b>Rural</b>	90%	91%
<b>United Kingdom</b>	<b>98%</b>	<b>98%</b>
<b>Urban</b>	99%	100%
<b>Rural</b>	88%	89%

Source: Ofcom analysis of MNO predictions (September 2023).

## 4G indoor coverage in England

Indoor coverage refers to the predicted availability of mobile coverage inside a building. This assumes that there is a signal strength loss of around 10 dB inside the building due to attenuation.<sup>9</sup>

Indoor coverage continues to vary significantly between urban and rural areas, with the extent of indoor 4G coverage in rural areas of England now ranging between 73-83% by operator, compared to 97-98% of urban premises. 96% of rural premises can receive indoor 4G coverage from at least one MNO, although only 50% can receive it from all four. Indoor voice coverage<sup>10</sup> tends to be higher, ranging from 80-98% across MNOs for rural premises (compared to 99-100% of urban premises).

There are often alternative solutions for consumers where indoor coverage is poor, including broadband-based calls on services such as WhatsApp, femtocells<sup>11</sup> and WiFi calling.<sup>12</sup> All four of the MNOs offer WiFi calling to their customers, although not all mobile phones support this feature. There are, however, a small number of premises in England that do not have a decent broadband connection, fixed wireless access, or good indoor 4G coverage (of at least 2 Mbit/s).

## Outdoor 5G and 4G geographic coverage in England

This sub-section focuses on geographic coverage of England where there is a sufficiently strong signal to provide a good 4G (and in some cases 5G) service outside.

5G geographic coverage for the UK as a whole is increasing steadily, but remains significantly lower than 4G coverage levels due to 5G rollout still being in a comparatively earlier stage. We estimate coverage from at least one operator is available to 41-55% of the UK landmass (ranging from the Very High Confidence to High Confidence level).

5G geographic coverage in England is more extensive than across the UK as a whole, with landmass coverage from at least one operator reaching 56% at the Very High Confidence level and 74% at the High Confidence level. This likely reflects the geographic composition of the UK, as 5G rollout has initially been concentrated in more densely populated areas, which are more common in England compared to the other UK nations which are significantly more rural.

Similar to 4G outdoor premises coverage, 4G geographic coverage has remained broadly stable over the past year, although small increases can be observed on some measures. In part, this is because 4G coverage is now widely available across most of England, particularly in urban areas.

**Table 3.2: Yearly increase in 4G geographic coverage, from at least one MNO and from all MNOs**

	From at least one MNO		From all MNOs	
	2022	2023	2022	2023
<b>England</b>	<b>98%</b>	<b>98%</b>	<b>85%</b>	<b>85%</b>
<b>Urban</b>	99%+	99%	98%	98%

<sup>9</sup> Attenuation refers to the weakening of a signal's strength due to noise, distance or other external factors.

<sup>10</sup> Voice coverage refers to the expected coverage for making phone calls, as opposed to the availability of internet service.

<sup>11</sup> A femtocell is a small, low-power cellular base station that connects to the parent network via a fixed internet connection.

<sup>12</sup> WiFi calling is the ability to make and receive a call and text/SMS over a WiFi network.

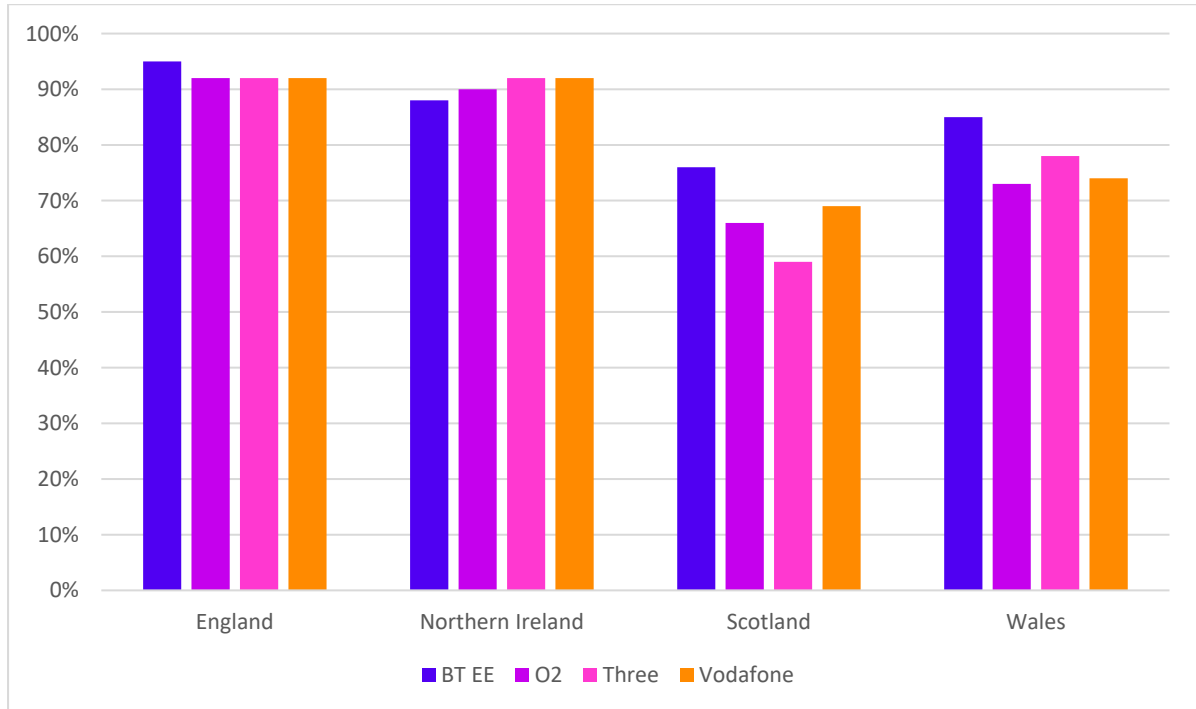


	From at least one MNO		From all MNOs	
<b>Rural</b>	97%	97%	83%	83%
<b>United Kingdom</b>	<b>92%</b>	<b>93%</b>	<b>70%</b>	<b>71%</b>
<b>Urban</b>	99%+	100%	97%	97%
<b>Rural</b>	91%	92%	67%	68%

Source: Ofcom analysis of operator data (September 2023).

4G geographic coverage in England remains higher than in the other UK nations for all four MNOs. As of September 2023, data from the MNOs showed coverage at 92-95% in England compared to 88-92% in Northern Ireland, 59-76% in Scotland and 73-85% in Wales, as demonstrated in Figure 3.3 below.

**Figure 3.3: Differences in 4G geographic coverage in England, Northern Ireland, Scotland and Wales**



Source: Ofcom analysis of MNO predictions (September 2023).

### Coverage on roads

Good mobile coverage along the road network is important to assist with vehicle communications, navigation, infotainment, and safety aids, particularly at times of high traffic and in rural areas.

4G coverage in England is predicted to be present in vehicles from all MNOs across 75% of major roads, with individual MNO coverage ranging from 89-92% for this metric.

In-vehicle mobile voice services are predicted to be available from all MNOs for 89% of major roads in England. This falls to 84% when accounting for just A or B roads in England.

## Progress of the Shared Rural Network

The Shared Rural Network (SRN) is a deal agreed between the UK Government and the MNOs in March 2020. Under this agreement the MNOs, with government support, would invest in a network of new and existing phone masts to improve mobile coverage across the UK, particularly in rural areas. MNOs have agreed to individual UK-wide and UK-nation level obligations as part of this, with obligations falling due in the summer of 2024, and in January 2027.

MNOs have continued with the programme of work towards their obligations to provide 4G coverage across 88% of the UK landmass (to be achieved by the end of June 2024). In total MNOs have now deployed more than 190 new sites since 2020 to meet their SRN targets, with 35 new sites added this year. They have also upgraded thousands of sites with a combination of additional spectrum and higher operating power.<sup>13</sup> Three of the four MNOs have added in the region of 1 percentage point of landmass coverage in the last year, and individual MNOs' 4G geographic coverage now stands as: BT/EE (87.5%), Vodafone (83.3%), Virgin Media O2 (81.7%) and Three (80.5%).<sup>14</sup> As a result, 4G coverage from at least one MNO has reached 92.7%.<sup>15</sup>

We note [reporting](#) that three MNOs have approached the UK Government to ask for an extension to the 2024 deadline. This deadline includes a requirement to achieve 88% 4G landmass coverage, which is set out in Ofcom spectrum licences. It is clear that three MNOs still have substantial progress to make to meet their deadlines, and we continue to prepare to assess MNOs compliance with the 88% threshold and associated nations obligations in summer 2024.

Alongside these individual licence obligations, the SRN also has a collective target to achieve 95% 4G landmass coverage across the UK by the end of 2025, based on the combined footprint of each MNO. The programme is also targeting an increase in the area of England with coverage from all four MNOs, which is forecast to rise from 84% to 90% by the end of the programme, with the area with coverage from at least one MNO rising from 97% to 98%.

More detail on the progress of the SRN across the UK in the last year can be found in our [UK Connected Nations report](#).

## The 3G switch-off has begun and plans for switching off the remaining 3G networks are underway

All MNOs have committed to switching off their 2G and 3G networks by 2033 at the latest, which will result in improved network efficiency and enable more spectrum to be used for faster 4G and 5G services. The MNOs are continuing to develop their own switch-off timetables for these legacy technologies and this year saw the initial stages of 3G retirement ahead of national 3G switch-off.

## Mobile Traffic

Mobile traffic continues to grow year-on-year, with 4G still playing a more significant role than 5G, as it continues to carry the dominant share (81%) of traffic across the UK.

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<sup>13</sup> By higher operating powers we mean bringing the transmit power of the site (which can impact both coverage and capacity) nearer to the limits authorised in operator's spectrum licences.

<sup>14</sup> Note that we are providing MNO coverage levels here to one decimal place, given the relevance of this greater granularity to understanding progress against SRN commitments, and that some of these coverage increases are not apparent where we are reporting to the nearest whole number elsewhere in this report.

<sup>15</sup> We are also providing detail of the 'at least one MNO' coverage to one decimal place in light of the SRN programme's stated objective to deliver 95% 4G geographic coverage on this measure by the end of 2025.

From 2022 to 2023, total monthly traffic in the UK has risen from 725 PB to 905 PB, an annual growth of around 25%. Although this growth rate is marginally lower than the c.27% reported last year, it aligns with [other reports](#) on mobile traffic growth internationally over the last year, indicating a decline in global mobile traffic growth.<sup>16</sup>

This year among the UK nations, England's share of traffic was at 85.3% (772 PB) of all monthly data traffic, a slight increase from 2022 when it carried 84.8% (615 PB).

5G traffic has shown the highest growth in data traffic from 63 PB in 2022 to 151 PB in 2023 across the UK, a growth rate of c.141%. Similarly, in England 5G traffic has increased significantly from 58 PB in 2022 to 137 PB in 2023.

As 5G adoption continues to rise, we anticipate further increases in handset data usage, which could support some transition towards fixed broadband alternatives for FWA users, as MNOs seek to enhance the overall customer experience.

Data consumption continues to be higher in urban areas than in rural areas, mainly due to population distribution as opposed to a significant difference in the data consumption of rural users.

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<sup>16</sup> Possible explanations to the decline in mobile traffic growth might include changes to population mobility (where more home-working might increase offload onto the fixed networks), or limitations on consumer demand (e.g. increased price sensitivity, or natural limits on data demands).