Connected Nations

Scotland Report 2024

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Section

1. Overview

Ofcom's objective is to make communications work for everyone, including to promote reliable, widely available and high-quality networks. In this annual Connected Nations report for Scotland, we measure progress on the availability of broadband and mobile services across Scotland and the UK. This includes providing updates on the rollout of the full fibre, fixed wireless access and 5G mobile networks.

Alongside this Scotland report, we are also publishing 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 the latest data for different areas of Scotland and the UK and in relation to specific services.

What we have found – in brief

There has been significant improvement in 4G mobile geographic coverage and also full-fibre fixed network availability in Scotland over the last year. This is delivering enhanced connectivity options for a broader range of the Scottish population and the nation's geography.

However, despite this strong progress, Scotland remains, by many metrics, the least connected of the UK's four nations. The situation is more challenging in rural and island areas where there is often an overlapping effect with lower connectivity speeds for both fixed and mobile technologies.

This report finds there are a range of innovative approaches and emerging technologies already tackling the remaining connectivity gaps, that could form part of future commercial and publicly funded rollout to deliver ubiquitous connectivity across Scotland.

Broadband

- **62% of residential properties have access to full-fibre networks in Scotland.** This is an increase of nine percentage points (265,000 premises) from September 2023 to July 2024.
- **Over three-quarters of Scottish households have gigabit-capable coverage.** The increase of five percentage points (166,000) means that 77% of premises can access gigabit-capable services.
- **Scotland's rural areas recorded the largest percentage point increase in superfast coverage of any geographic area in the UK.** The additional 26,000 Scottish rural premises that now have superfast broadband marked an increase of four percentage points.
- **Take up of services on full-fibre networks has increased significantly,** by seven percentage points from 28% in May 2023 to 35% in July 2024.
- **Take-up of satellite broadband has nearly doubled in Scotland.** Starlink connections in Scotland have increased from 6,000 to 11,000. The technology offers the potential to bring connectivity to areas where building fixed or mobile connections is traditionally challenging.

- **The number of premises not able to access decent broadband continues to decrease.** Only 0.5% (16,000) premises in Scotland cannot access decent broadband from fixed-lines or Fixed wireless access (FWA).[1] This is a decrease of around 2,000 premises over the last year.

Mobile

- **The availability of 5G services continues to grow steadily**. In Scotland, 5G coverage outside of premises from at least one Mobile Network Operator (MNO) is now at 91% (up from 88% in 2023) for the High Confidence measure.[2]
- **Programmes to enhance mobile connectivity in rural Scotland are making significant progress**. At least one MNO now covers 89% (up five percentage points) of landmass in Scotland, and all four MNOs cover 65% of Scotland (up 17 percentage points). Scotland continues to have the lowest 4G coverage across the nations, but it has recorded the highest growth in this measure.
- **4G availability outside Scottish premises has continued to increase.** This change has been driven by increased 4G coverage in rural areas, with the range of coverage across the four MNOs improving from 90-98% last year, to 96-98% this year.
- **Scotland now has the highest 4G coverage from all four MNOs for indoor premises in the UK.** 89% of Scottish indoor premises now have 4G coverage from all four MNOs.

[1] FWA services can be delivered by MNOs or Wireless Internet Service Providers. See page 17 of the Connected Nations: UK Report 2024.
[2] Further information on this measure can be found in the 'Background to mobile technologies' box on Page 15 of this report.

2. Fixed Broadband and Voice

Introduction

Full-fibre fixed networks are continuing to expand across Scotland, delivering faster and more reliable broadband and voice services to homes and businesses. In this section, we provide an update on the rollout and consumer take-up of services on these networks over the past year. We also provide updates on the deployment of fixed wireless and satellite networks that are delivering alternative forms of broadband connectivity, as well as providing the latest data on the premises that still do not have access to decent broadband.

Growing connectivity across Scotland and the rest of the UK is taking place in the context of broader changes to the fixed telecoms sector. For more information on these developments, please refer to our Connected Nations: UK Report 2024, or our update on Planned Network Deployments for Very High Capacity networks in the UK for the next three years, published in September 2024.

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

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

	Gigabit-capable (residential)	Full fibre (residential)	Superfast (residential)	Unable to get decent (all properties)
UK	83%	69%	98%	0.2%
Scotland	77%	62%	96%	0.5%
Northern Ireland	94%	93%	98%	0.2%
Wales	74%	68%	96%	0.5%
England	84%	69%	98%	0.1%

Source: Ofcom analysis of provider data (July 2024).

Background: fixed-line broadband services

Fixed connections provide broadband access at specific locations, such as residential or business premises. Fixed-line broadband technologies can be broken down into different technology types.

There are **four** primary types of fixed-line connections for fixed broadband access:

- **ADSL**[3]– Copper (telephone) cables are used to connect the exchange to each premises. Maximum download speed is up to 24 Mbit/s. Actual speeds delivered diminish with length of cable from exchange to the premises.
- **Fibre to the cabinet (FTTC)** – FTTC involves fibre to the street cabinet, with copper cables connecting the cabinet to the premises. FTTC uses 'very high-speed digital subscriber line' (VDSL) technology.[4] As with ADSL, speeds diminish with length of cable, but as cabinets are generally located close to premises, maximum download speed is normally up to 80 Mbit/s.
- **Hybrid fibre coaxial (HFC) cable** – With HFC, there is fibre to a street cabinet and coaxial cable from the cabinet to the premises. Because there is decreased signal loss compared to copper, HFC can deliver higher speeds over longer distances. Cable broadband in the UK is provided by Virgin Media O2, and its cable network can deliver gigabit speeds.[5]
- **Full fibre or 'fibre to the premises' (FTTP)** – The connection from the exchange to the premises is provided entirely over fibre. Generally, distance to the premises does not affect the speed delivered. Full fibre can deliver gigabit speeds.[6]

We categorise fixed broadband connections based on the download speed they can provide:

- **Decent** – can provide at least 10 Mbit/s download and 1 Mbit/s upload speeds.[7] It can be delivered by ADSL, FTTC, HFC cable or full fibre. Decent broadband provides sufficient speeds for making a high-definition video call. Over minimum decent broadband, downloading a one-hour HD TV episode (1 GB) would take almost 15 minutes.
- **Superfast** – can provide download speeds of at least 30 Mbit/s and can be delivered by FTTC, HFC cable or full fibre. Superfast broadband provides sufficient speed for one person streaming 4K/UHD video. Downloading a one-hour HD TV episode would take under four and a half minutes and several devices can work simultaneously.
- **Gigabit-capable** – can offer download speeds of 1 Gbit/s and above. It can be delivered by HFC cable or full fibre. With gigabit-capable broadband, it is feasible to download a full 4K film (100 GB) in under 15 mins, or a one-hour HD TV episode in eight seconds.

[3] ADSL: Asymmetric Digital Subscriber Line.
[4] Another technology known as G.fast is also sometimes deployed at, or near, a limited number of cabinets offering higher speeds than VDSL.
[5] Cable broadband HFC access networks are shared between a large number (usually hundreds) of premises.
[6] Most full-fibre access networks utilise Passive Optical Network (PON) approaches where capacity in the downstream and upstream direction is shared between around 30 to 60 users.
[7] The UK Government defines the characteristics of 'decent broadband'. This is the level of connection currently deemed necessary for consumers to participate in a digital society.

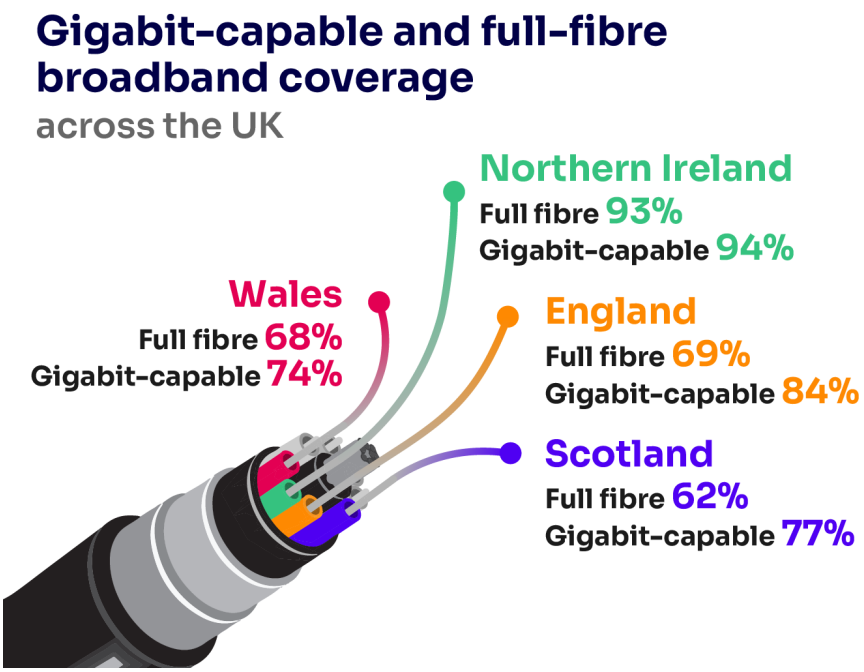
Full-fibre and gigabit-capable coverage

There has been continued investment in full-fibre broadband networks in Scotland which has resulted in notable improvements in coverage over the past year.

Our data shows that 62% (1.7 million) of residential premises in Scotland are now served by a full-fibre connection in July 2024, an increase of nine percentage points from September 2023. Gigabit-capable broadband coverage has also increased to be available at 77% (2.1 million) of residential premises, up five percentage points from last year. These are significant increases in a year, though in both cases, the rate of increase in Scotland is slightly lower than in England and Wales.

Figure 2.2 highlights the availability of full-fibre and gigabit-capable networks for residential premises across the four nations of the UK. Coverage in Scotland remains below the UK averages of 83% (25 million) for gigabit-capable networks and 69% (20.7 million) for full-fibre networks. Northern Ireland continues to have the most widespread availability of full-fibre networks across the individual UK nations.

Figure 2.2: Gigabit-capable and full-fibre broadband coverage by UK nation



Source: Ofcom analysis of provider data (July 2024).

Table 2.1 shows the differences in coverage of full-fibre and gigabit-capable networks between urban and rural areas of Scotland.

Full-fibre networks are available at 42% of residential premises in rural Scotland, up ten percentage points from last year. Full-fibre coverage in rural areas across the UK is still higher at 52%. Similarly, gigabit-capable networks are available at 43% of premises in rural Scotland, up nine percentage points from last year. Gigabit-capable coverage in UK rural areas is also higher at 54%.

Notably, there is a difference in reliance on full-fibre networks in urban and rural Scotland. Urban areas have more HFC cable coverage which can also provide gigabit-capable services, whereas in rural areas, there is very little gigabit-capable coverage beyond full-fibre networks.

Table 2.1: Residential gigabit-capable and full-fibre coverage in Scotland by rurality

	Gigabit capable	Full fibre
Urban	85% (1.9m)	67% (1.5m)
Rural	43% (0.2m)	42% (0.2m)
Total	**77% (2.1m)**	**62% (1.7m)**

Source: Ofcom analysis of provider data (July 2024).

Our Planned Network Deployments 2024 update shows that the expected commercial rollout of full-fibre coverage is accelerating in Scotland. Full-fibre coverage in Scotland is predicted to be 77% in May 2025, up two percentage points on the May 2025 forecast in the 2023 report. By May 2027, both full-fibre and gigabit-capable coverage are now predicted to reach 94% in Scotland.

Improvements in coverage have also been supported by public sector investment. The Scottish Government's Reaching 100% (R100) programme seeks to ensure every home and business in Scotland can access superfast broadband, defined as of at least 30 Mbit/s download speed. As of November 2024, the R100 programme has delivered over 68,000 connections, including 4,600 through the Scottish Broadband Voucher Scheme.[8]

The UK Government's Project Gigabit programme continues to bring gigabit-capable coverage to hard-to-reach communities across the UK. Following a Public Review, in May 2024, the Scottish Government launched the first two Project Gigabit regional procurements in Scotland, covering approximately 11,000 premises in East Lothian and the Borders, and approximately 48,000 premises in Aberdeenshire, Angus, Dundee, and the Moray Coast areas, respectively.[9]

As with other technologies, and as noted above, there are significant differences in the availability of full-fibre broadband in urban and rural areas. This is reflected in the widely varying levels of full-fibre coverage across Scotland's 32 local authority areas.

The lowest levels of residential full-fibre broadband coverage in Scotland are found in Na H-Eileanan An Iar (Outer Hebrides) while the highest level of coverage is found in Aberdeen City. Detailed coverage data for each Scottish local authority is available in our interactive report.

Table 2.2: Highest and lowest levels of residential full fibre broadband coverage by selected Scottish local authority area

Rank	Scottish Local Authority	% of premises with full fibre coverage
1	Aberdeen City	90%
2	Midlothian	89%
3	Glasgow City	89%
30	Orkney Islands	14%
31	Shetland Islands	11%
32	Na H-Eileanan An Iar	6%

[8] Scottish Government, R100 – Data Insights, 1 November 2024
[9] Scottish Government, Gigabit in Scotland - public review: report - revision 3, 2 September 2024

Source: Ofcom analysis of operator data (July 2024).

Superfast coverage

Superfast broadband services – defined as services with download speeds of at least 30 Mbit/s – are available to around 96% (2.6 million) of residential premises in Scotland, an increase of one percentage point (39,000) compared to last year. This increase has been driven by an expansion of superfast broadband in rural Scotland. While superfast coverage in urban areas has plateaued, coverage in Scottish rural areas has increased by four percentage points. This percentage point increase is the largest of any geographical area in the UK.

Table 2.3: Residential superfast broadband coverage

Nation	Total	Urban	Rural
Scotland	96% (2.6m)	99% (2.2m)	83% (0.4m)
England	98% (24.6m)	99% (21.7m)	90% (2.9m)
Northern Ireland	98% (0.8m)	99%+ (0.6m)	95% (0.2m)
Wales	96% (1.4m)	99% (1.1m)	87% (0.3m)
UK	**98% (29.4m)**	**99% (25.6m)**	**89% (3.8m)**

Source: Ofcom analysis of operator data (July 2024).

Take-up of services on full-fibre networks

It is important to understand whether consumers are benefiting from higher-speed broadband services when they are available. We estimate that, where available, the take-up of services on full-fibre networks in Scotland is around 35%, up seven percentage points from May 2023.

We expect full-fibre take-up to continue to rise further in the years ahead because, while networks are being deployed at pace, take-up tends to lag behind coverage. This is partly a by-product of the rapid deployment of full fibre in the last year, where initially demand can lag behind the increase in supply.

Table 2.4: Take-up of broadband services on full-fibre networks (as a percentage of all premises where those services are available)

Nation	Full fibre
Scotland	35%
England	33%
Northern Ireland	53%
Wales	39%
UK	**35%**

Source: Ofcom analysis of provider data (July 2024).

Data usage over fixed networks

The average monthly data usage (the total amount of data downloaded and uploaded over the broadband connection) per fixed connection in Scotland is 480 GB.[10] For consumers who have a full-fibre connection, the average monthly usage is considerably higher at 627 GB.

Data usage in Scotland is the lowest of any UK nation. In urban areas, Scotland uses, on average, 35 GB less than urban areas in the rest of the UK. However, the difference is more pronounced in rural areas, where average usage in Scotland is 156 GB less than rural areas in other UK Nations. This is owing to a combination of factors, including greater reliance on older technology offering lower download speeds, and therefore using less data.

Wireless and Satellite coverage

Background on Fixed Wireless Access and Satellite technologies is provided in the Connected Nations: UK Report 2024.

Fixed wireless access (FWA) on mobile networks

Fixed wireless access (FWA) services from the MNOs are provided primarily over 5G and advanced 4G (LTE-A). Three of the UK's four MNOs currently offer FWA services in the UK.

Based on information from the operators about their coverage levels, we estimate that 95% of premises in Scotland have access to a fixed wireless service from a mobile operator, in line with the coverage we reported last year and the 2024 figure for the UK as a whole.[11]

FWA services offered over the MNOs' 4G and 5G networks share the network capacity with mobile users, meaning that the capacity of the network must be carefully managed between the demands of existing mobile users and FWA customers. Therefore, there may be areas of high mobile demand where a reliable FWA service cannot be offered.

Fixed wireless access via wireless ISPs (WISPs)

Fixed wireless services can also be delivered over networks that communicate via a wireless link between a provider's mast site and an external antenna fixed to a customer's premises. These mostly use licence-exempt or lightly licensed spectrum, and due to the range of frequencies being used to deliver this service, performance may sometimes be limited by line-of-sight issues. We are beginning to see some use of 5G technology, which alleviates some of these line-of-sight issues.

We have collected WISP data this year from 20 providers. Based on estimates from these providers, around 2% of residential premises in Scotland have coverage from a WISP network, below the UK average of 7%.

[10] Data usage is the total data downloaded and uploaded over the broadband connection during July 2024. Due to a change in methodology, this usage data is not directly comparable with usage data reported in previous years.

[11] Our reporting here is based on data from EE and Three – see the Annex to the UK report for further information on the methodology.

Table 2.5: Coverage of MNO and WISP FWA networks with at least decent broadband (residential)

Nation	MNO FWA	WISP FWA
Scotland	95% (2.7m)	2% (0.06m)
England	96% (25.6m)	6% (1.7m)
Northern Ireland	84% (0.7m)	3% (0.03m)
Wales	93% (1.5m)	22% (0.4m)
UK	**95% (30.6m)**	**7% (2.1m)**

Source: Ofcom analysis of provider data (July 2024).

Satellite services

Satellite technologies continue to evolve, and Low Earth Orbit (LEO) satellite constellations particularly could potentially help to serve parts of Scotland which are harder to reach through more traditional technologies.

LEO satellite constellations can offer high-speed, lower-latency services relative to traditional geostationary (GSO) satellites. The LEO retail market is at an early stage of development and take-up remains low compared to terrestrial broadband services, though it is increasing.

Starlink currently offers the only direct to consumer Low Earth Orbit (LEO) service in the UK through its retail 'plug and point to the sky' product. This delivers nationwide broadband coverage, including in harder-to-reach areas. The data provided to us by Starlink shows that the number of users in Scotland has nearly doubled, with 11,000 connections in June 2024, up from 6,000 in August 2023.

Access to decent broadband

The number of premises not able to access decent broadband services in Scotland has decreased.

We estimate that 2% of premises, residential and commercial, cannot access decent broadband, which is defined as connection which provides at least 10 Mbit/s download speed and 1 Mbit/s upload speed, from a fixed-line connection. This is around 65,000 premises in Scotland, a decrease of around 8,000 since last year. This decrease accounts for around a third of the total decrease in the number of premises in the UK that have no access to decent broadband coverage.

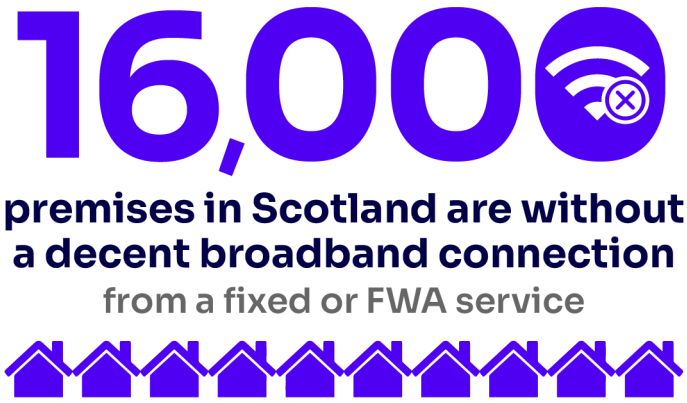
Of those premises that do not have access to decent broadband via fixed-lines, some will be able to access decent broadband via fixed wireless access through MNOs or WISPs. After taking account of the coverage available from FWA, we estimate that this leaves around 0.5% or 16,000 premises in Scotland without a decent broadband service from either fixed-line or fixed wireless networks. This is a decrease of 2,000 premises since September 2023.

Table 2.6: Approximate remaining premises without access to a decent broadband service from either a fixed or wireless network, 2023 and 2024[12]

Nation	2023	2024
Scotland	0.6% (18,000)	0.5% (16,000)
England	0.1% (33,000)	0.1% (33,000)
Northern Ireland	0.3% (3,000)	0.2% (2,000)
Wales	0.5% (8,000)	0.5% (8,000)
UK	**0.2% (61,000)**	**0.2% (58,000)**

Source: Ofcom analysis of provider data (September 2023 and July 2024).

Figure 2.3: Number of premises without a decent broadband connection in Scotland



Source: Ofcom analysis of provider data (July 2024).

Broadband universal service obligation (USO)

The broadband USO 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).[13]

Where an affordable service with these characteristics is not available, or 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.[14] Where the costs are above £3,400, the customer has the option to pay the excess costs to get a USO connection.

[12] All figures in the table have been rounded to the nearest 1,000.
[13] In particular, these characteristics are: (i) a contention ratio of no more than 50:1; (ii) latency which is capable of allowing the end user to make and receive voice calls effectively; and (iii) the capability to allow data usage of at least 100 GB a month.
[14] In March 2020, we specified in the USO conditions that an affordable service was one that costs £45 per month, rising annually by CPI. This has now risen to £56.20 per month in line with CPI.

Some of the premises that are eligible for the USO will have access to decent broadband by December 2025 as a result of publicly funded planned coverage. Across the UK, these programmes will cover 10,000 premises, around half of which are in Scotland. This will leave 48,000 premises with no access to decent broadband by the end of 2025, of which 11,000 will be in Scotland.

BT is the universal service provider for the UK (excluding Hull), and KCOM for the Hull area. They are required to provide the USO and to report at six monthly intervals on delivery.[15] As of September 2024, BT had received 115 orders in Scotland (compared with just over 2,000 orders across the UK). This will provide access to decent broadband for an extra 540 premises in Scotland. Each order requires network build that can serve multiple premises, and therefore these orders will lead to full-fibre connections being built that can serve over 10,000 premises.

To ensure the broadband USO remains relevant, a review provision was included in the legislation and the process to review is likely to be triggered when superfast broadband is taken up by at least 75% of all premises.[16] As of July 2024, 75% of all premises have taken up superfast broadband.

In October 2023, the Government consulted on a review of the broadband USO and we will continue to engage with Government on the future approach to the USO.

The migration from legacy voice services to digital voice continues

The UK's traditional landline voice services are undergoing a substantial transition as network operators retire their legacy systems (referred to as the Public Switched Telephone Network, or 'PSTN') and replace them with modern systems. BT and Openreach are now looking to retire BT's PSTN network and the Openreach wholesale services that deliver PSTN by January 2027 and we understand that other providers are following a broadly similar timescale.

To make sure landline services continue to be available to their customers, providers of legacy telephony networks have started delivering landline calls over a broadband connection, using a digital technology called Voice over Internet Protocol (VoIP). This is commonly known as a digital landline. BT has also developed an interim solution, called "pre-digital phone line", for certain complex or difficult to migrate customers such as landline-only or critical national infrastructure customers. This will allow those customers to move off the PSTN without the need to install a broadband connection or change legacy equipment.[17]

We continue to monitor the migration closely and engage with providers to ensure that disruption is minimised and vulnerable customers are protected from harm.[18]

For more information on this, please refer to the Connected Nations: UK Report 2024.

[15] BT, USO Reports. KCOM, USO Reports. To date KCOM has not received any eligible USO orders.
[16] Under the Communications Act 2003, the Secretary of State is likely to issue Ofcom with a direction to review the broadband USO if it appears to them that, on the basis of information we have published, take-up of superfast broadband has reached at least 75% of all UK premises.
[17] BT, *BT Group refines its digital switchover programme for the UK's full fibre future*, 20 May 2024.
[18] Ofcom, *Protecting customers during the migration to digital landlines*, 18 December 2023.

3. Mobile, data and voice

Introduction

Mobile coverage is continuing to expand across the UK, ensuring that more people can access the benefits of reliable mobile services.

In this section, we provide an update on the progress mobile network operators (MNOs) are making with their 5G rollout plans. We also report on the availability of 4G mobile coverage across Scotland – which continues to underpin the mobile experience for consumers – both outside and inside premises and across its landmass. The section also looks at investment in and use of mobile services across Scotland.

We recommend that this section is read in conjunction with the 'Mobile, data and voice' section in our Connected Nations: UK Report 2024.

Summary of mobile coverage

Figure 3.1: Overview of voice and data coverage across the UK[19]

	5G outside premises (MNO range)	4G outside premises (MNO range)	4G geographic (MNO range)	4G total not spots	Voice and text total not spots
UK	61-79%	99-99+%	88-89%	5%	3%
Scotland	54-76%	99-99+%	77-80%	11%	7%
Northern Ireland	36-90%	98-99%	89-95%	2%	<1%
Wales	16-80%	98-99%	83-89%	5%	3%
England	65-81%	99-99+%	94-96%	1%	1%

Source: Ofcom analysis of operator data (September 2024)

[19] Note that the MNO range for 5G outside premises presented here is based on our 'High Confidence' measure.

Background to mobile technologies

Mobile services described in this section include:

- 5G, the current generation of wireless technology, is faster than previous generations of wireless technology, as it offers greater capacity, allowing an increased number of devices to be connected at the same time in a small area. It is also more responsive by reducing latency which is the time between instructing a wireless device to perform an action and that action being completed.
    - 5G non-standalone (5G NSA) involves deploying 5G radio equipment alongside existing 4G and is supported by the 4G core network. This delivers an increase in capacity and allows MNOs to support demand as it continues to grow, without the congestion and degradation of service quality that would otherwise result.
    - 5G standalone (5G SA) involves the deployment of a new 5G core network. This could enable new use cases such as Augmented Reality (AR) /Virtual Reality (VR) and robotics, supported by the broader capabilities of 5G including ultra-low latency, advanced virtual network (slicing) functions,[20] and potentially improved coverage.[21] 5G SA referred to in this chapter is specifically in relation to mobile standalone deployment.

When reporting on 5G mobile availability predictions, we refer to confidence ranges[22] reflecting the likelihood of on the ground coverage for consumers as:

- High Confidence associated with a signal strength (-110 dBm), to equate to at least an 80% confidence level.
- Very High Confidence associated with a higher signal strength (-100 dBm), to equate to a circa 95% confidence level.

- 4G, 3G and 2G are older generations of mobile standards with specified features. In particular, 3G supported the use of data applications such as web browsing, while 4G has supported more data intensive activities such as streaming and gaming.

[20] Network slicing is a feature of 5G SA networks that allows an MNO to create multiple virtual networks (slices) on top of its common shared physical infrastructure. The virtual networks are then customised to operate with specific quality of service and meet the specific needs of applications, services, devices, customers or operators.

[21] Augmented Reality (AR): an enhanced version of the real physical world that is achieved through the use of digital visual elements, sound, or other sensory stimuli delivered via technology. It overlays digital content, which could include a combination of sound, video, text, and graphics, onto a real-world environment using a headset or a device with a camera, such as a mobile phone.
Virtual Reality (VR): use of a headset to access a virtual experience, which could be digitally created or a captured 360° photo or video.

[22] Signal strength measured on the 4G common reference signal and 5G secondary synchronisation block – for further detail see our Methodology annex.

5G coverage

The mobile coverage data in this report is based on predictions provided to us by the MNOs. To evaluate the accuracy of the information provided to us, we undertake regular testing (including across Scotland) to ensure the predictions provided are suitable for national and regional reporting.

Our approach to reporting on 5G availability is set across a confidence range covering High Confidence and Very High Confidence, which reflects the likelihood of on the ground coverage for consumers in a particular location. We report 5G mobile coverage as merged 5G NSA and SA. We aim to explore ways with MNOs to report on 5G SA and 5G NSA separately as mobile networks evolve. Our approach to reporting on 5G coverage is set out in more detail in our Connected Nations: UK Report 2024.

5G is within reach of a growing number of consumers, with around 50% of mobile handsets now 5G capable and notable increases in coverage observed across the UK.[23]

Outdoor premises coverage of 5G

Deployment of 5G across Scotland and the UK has increased in 2024. In Scotland, 5G coverage outside of premises from at least one MNO is now at 91% (up from 88% in 2023) for the High Confidence measure and 85% (up from 80% in 2023) for Very High Confidence measure. On a UK-wide basis, coverage outside premises from at least one MNO in September 2024 stands at 95% (High Confidence) and 90% (Very High Confidence), up from 93% and 85% respectively in 2023.[24]

Table 3.1 below shows the range of outside premises 5G coverage between individual MNOs in Scotland, which, based on our High Confidence level, is 54% to 76%. This represents an increase since 2023 of six percentage points at the top of the range, and 15 percentage points at the bottom of the range. Across UK nations, 5G coverage outside of premises ranges across individual MNOs is as follows: 65-81% for England; 16-80% for Wales; and 36-90% for Northern Ireland (all based on our High Confidence level).

Table 3.1: Range of 5G coverage outside of premises in Scotland across individual MNOs, by year

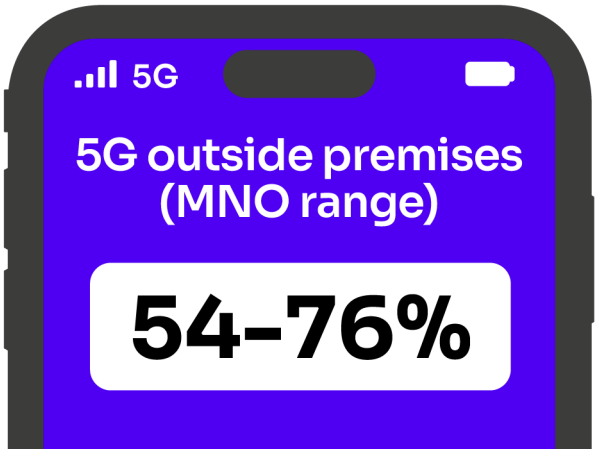
	2023	2024
High Confidence	39-70%	54-76%
Very High Confidence	25-60%	35-71%

Source: Ofcom analysis of operator data (September 2023 and September 2024).

[23] The methodology for calculating the total number of devices varies across MNO making this figure an approximation rather than an exact figure. Additionally, we note that not all 5G capable devices may be enabled with a 5G subscription.

[24] 5G coverage figures reported in this chapter are slightly lower than the actual 5G coverage due to data inconsistencies affecting 5G standalone reported by one of the MNOs during the later stages of our publication process. We are looking into the effect of this at both the UK and nations level to determine if an update is needed.

Figure 3.2: The MNO range for 5G coverage outside premises at the high confidence level.



Geographic 5G coverage

The expansion of 5G landmass coverage by individual MNOs is progressing, albeit at a modest pace, ranging from 15% to 42% of the landmass at High Confidence, and 8-35% at the Very High Confidence level (up from 11-38% and 6-26% respectively last year). In Scotland, the range between MNOs of 5G geographic coverage at the high confidence level is 6-19% (up from 4-15% in 2023) and 3-16% at the very high confidence level (up from 1-10%) in 2023.

5G deployments

Additional 5G deployments have driven these increases in coverage, with over 23,100 5G deployments now in place across the UK, up from around 18,500 in 2023.[25] Of these, 9% are located in Scotland, 84% in England, 4% in Wales and 2% in Northern Ireland, broadly in line with previous trends and reflecting national distribution of all mobile traffic across the UK. Urban areas have seen the most significant deployment with 42% of sites in urban areas now equipped with 5G, compared to 29% in suburban areas and 16% in rural areas, an increase from 34% for urban, 20% for suburban and 10% for rural reported last year.

It is important to acknowledge that there is a diversity of deployment strategies from MNOs, leading to potentially different consumer experiences within this coverage footprint. These differences in deployment strategies are reflected in the coverage ranges outlined above, while Table 3.2 below highlights the coverage levels of individual MNOs within those ranges for premises in Scotland.[26]

Table 3.2: 5G outside premises coverage in Scotland by mobile operator

	Very High Confidence	High Confidence
BT/EE	71%	76%

[25] It should be noted that these deployments do not necessarily equate to a total of individual sites across all MNOs. For example, two MNOs may be offering coverage from the same site.

[26] The data we have received from Three shows a drop in its 5G coverage compared to our reporting in last year's Connected Nations report from September 2023. Three has stated that this is mainly due to configuration changes in their network and some minor adjustments in their prediction model for a handful of sites, but that these changes do not have an adverse impact on the overall 5G experience for their customers.

	Very High Confidence	High Confidence
Three	35%	64%
Virgin Media O2	54%	61%
Vodafone	38%	54%

Source: Ofcom analysis of operator predictions (September 2024).

4G and voice coverage

Geographic 4G coverage

Overall, 4G geographic coverage across the UK is stable compared with 2023.[27] Nonetheless, there remain significant differences in coverage across the UK's nations. Individual operator coverage across Scotland's landmass ranges from 77% to 80%.

Most MNOs have made significant improvements in their geographic coverage this year. As outlined in Table 3.3, Vodafone has overtaken BT/EE to have the highest levels of geographic coverage across Scotland's landmass at 80% (up 11 percentage points from last year), while Three has had the most substantial improvement of any MNO with an 18 percentage point increase. There has also been a compression in the range of coverage offered across the four MNOs from 17 percentage points in 2023, to three percentage points in 2024.

Table 3.3: 4G geographic coverage in Scotland by MNO

	2023	2024
BT/EE	76%	79%
Three	59%	77%
Virgin Media O2	66%	79%
Vodafone	69%	80%

Source: Ofcom analysis of MNO predictions (September 2023 and September 2024).

Table 3.4 demonstrates that the availability of 4G coverage across Scotland's rural landmass increased for all MNOs in 2024, compared to 2023, with Vodafone having the highest level of coverage at 80%, while Three had the largest rate of increase at 18 percentage points.

Table 3.4: 4G geographic coverage in rural Scotland by MNO

	2023	2024
BT/EE	76%	78%

[27] This coverage is reported to the nearest full integer (whole number), consistent with past publications. We note that in the Shared Rural Network section below, we report MNOs' progress against their commitments to one decimal place, therefore providing a more detailed view of each MNO's level of progress for that purpose.

	2023	2024
Three	58%	76%
Virgin Media O2	66%	78%
Vodafone	69%	80%

Source: Ofcom analysis of MNO predictions (September 2023 and September 2024).

Levels of 4G geographic coverage by at least one MNO remained relatively stable across the UK. However, there has been notable growth in this coverage measure of five percentage points in rural Scotland. This is the joint largest increase (alongside that of rural Wales) of any rural or urban area in the UK.

Table 3.5 provides information on the differences in 4G geographic coverage from all operators across the UK. 4G geographic coverage across Scotland from all four MNOs has increased significantly by 17 percentage points (from 48% to 65%), which is the biggest improvement across the UK. This substantial increase benefits consumers in Scotland by offering more choice across a wider range of Scotland's geography. However, Scotland still has the lowest 4G geographic coverage of the UK nations, across all four MNOs.

Table 3.5: 4G geographic coverage from all MNOs by UK nation

Nation	% of landmass served by all operators (2023)	% of landmass served by all operators (2024)
Scotland	48%	65%
England	85%	90%
Northern Ireland	81%	85%
Wales	62%	75%
UK	**71%**	**80%**

Source: Ofcom analysis of MNO predictions (September 2023 and September 2024).

The Shared Rural Network (SRN) is likely to have contributed to this rise in 4G geographic coverage in Scotland.

On 9 March 2020, the UK Government announced that it had entered into an agreement with the four MNOs to grant funding for a Shared Rural Network (SRN). Under the terms of this agreement, each of the four MNOs has committed to provide good quality 4G data and voice coverage to 88% of the country's landmass by 30 June 2024, and 90% by 31 January 2027.[28]

On 12 September 2024, Ofcom published an update on the compliance of UK MNOs with their SRN coverage obligations and confirmed that BT/EE, Vodafone and VMO2 had met the 88% UK-wide threshold and their individual thresholds for each UK nation.[29] We reported that, as of 30 June 2024,

[28] Good quality coverage is defined as the ability to sustain a 90 second voice call and access data speeds of at least 2 Mbps, with a methodology to assess this based on a 4G signal of at least -105 dBm

[29] https://www.ofcom.org.uk/siteassets/resources/documents/spectrum/spectrum-information/mobile-coverage-obligation/shared-rural-network-coverage-obligations.pdf?v=379965

their UK wide 4G coverage levels were 88.9%, 88.7% and 88.1%, respectively. We said we would undertake a further assessment of new information provided by Three, and published a further update on 6 November 2024.[30] This confirmed that Three had subsequently met its outstanding UK-wide and Scotland coverage obligation thresholds, reaching 88.6% 4G geographic coverage.[31] This assessment was informed by coverage predictions submitted by the MNOs for the time these obligations fell due, and Ofcom's subsequent measurement work.[32]

Additionally, the Scottish Government's 4G Infill Programme (S4GI) is a £28.75m project to improve mobile, voice, and data coverage in rural Scotland. In 2024, the Scottish Government completed the programme meaning that there are now 55 live masts providing enhanced mobile connectivity to rural communities across Scotland.

Although not the primary focus of these initiatives, which aimed to reduce partial not spots at this stage, they have potentially contributed (alongside commercial deployment) to another decrease in the proportion of Scotland's landmass with no 4G coverage from any MNO. Table 3.6 outlines that the percentage of Scotland's landmass which is a total not spot decreased from 16% in 2023 to 11% in 2024. This decrease is the largest in the UK. The overall UK total not spot area has also reduced by two percentage points to 5% in 2024.

Table 3.6: 4G geographic coverage by UK nation

Nation	Total not spots (% of landmass)	
	2023	2024
Scotland	16%	11%
England	2%	1%
Northern Ireland	3%	2%
Wales	9%	5%
UK	7%	5%

Source: Ofcom analysis of MNO predictions (September 2023 and September 2024).

Geographic voice coverage

Mobile voice services from all four MNOs are now available across 69% of Scotland's geography, compared to 61% in 2023. This reflects an increase of eight percentage points, to 68%, in rural coverage, while urban coverage remains at 99%.

Geographic voice coverage from one MNO increased more in Scotland than any other part of the UK. The increase, from 90% to 93%, in Scotland was driven entirely by an increase of three percentage points in Scotland's rural areas.

Outdoor premises 4G coverage

[30] https://www.ofcom.org.uk/siteassets/resources/documents/spectrum/spectrum-information/mobile-coverage-obligation/srn-coverage-obligations--2024-assessment.pdf?v=384335

[31] Overall, 4G coverage by at least one MNO across the UK landmass now stands at 95.3% (source: Ofcom analysis of operator data September 2024)

[32] https://www.ofcom.org.uk/siteassets/resources/documents/spectrum/spectrum-information/mobile-coverage-obligation/shared-rural-network-compliance-methodology.pdf?v=369242

Individual MNOs continue to provide a high level of 4G coverage outside of premises in Scotland, with coverage ranging between 99-100% of premises. In addition, 98% of premises have outdoor 4G coverage from all four operators, compared with 99% across the UK.

There remains a difference between levels of urban and rural outside premises coverage in Scotland, but this difference has decreased. Individual operators' 4G coverage outside rural premises range from 96-98% (up from 90-98% in 2023), with coverage from all operators reaching 93% (up seven percentage points from last year). A breakdown of coverage by MNO is provided in Table 3.7. Individual operators each provide outside coverage of 100% to urban premises in Scotland.

Table 3.7: Outdoor premise 4G coverage in rural Scotland (by operator)

MNO	% of rural premises with outdoor 4G coverage
BT/EE	98%
Three	96%
Virgin Media O2	97%
Vodafone	98%

Source: Ofcom analysis of MNO predictions (September 2024).

Outdoor premises voice coverage

Around 99% of premises in Scotland have voice coverage outside from all four MNOs. This drops to 95% for premises in rural Scotland (2023: 93%). Almost every premise in Scotland (whether urban or rural) has outdoor voice coverage from at least one MNO.

Indoor premises 4G coverage

Several factors can affect the coverage people receive indoors. These include the thickness of the walls, the building materials used in construction, and where in a building people are using their phone.[33] As a result, some premises may see differences between the operators' predicted indoor coverage data and the actual coverage experience.[34]

Table 3.8 below outlines 4G coverage for indoor premises across the UK. 89% of indoor premises in Scotland now have 4G coverage from all four operators, up three percentage points from 2023. This increase has made Scotland the UK nation with the highest percentage of 4G coverage from all four MNOs for indoor premises.

Table 3.8: Indoor premises 4G coverage by UK nation

Nation	At least one MNO	All four MNOs
Scotland	99%+	89%

[33] Ofcom's Mobile Coverage Checker provides information on the likelihood of there being indoor coverage in buildings at different locations and explains more about the factors that affect mobile signal indoors.
[34] Ofcom determines indoor coverage by applying an average building entry loss of 10dB across buildings. We acknowledge this approach provides only a simplified view of indoor coverage and that the real experience depends heavily on the types of building material and insulation in a specific building.

Nation	At least one MNO	All four MNOs
England	99%+	88%
Northern Ireland	99%	74%
Wales	99%	80%
UK	**99%+**	**88%**

Source: Ofcom analysis of MNO predictions (September 2024).

In rural Scotland, indoor premises 4G coverage from individual MNOs ranges between 85% and 88% (up from 75% and 85%, respectively, in 2023). Indoor 4G coverage from all four MNOs in rural Scotland is available in 67% of premises, up from 57% last year.

In urban areas of Scotland, 95% of premises can access a 4G service indoors from all four MNOs compared to 93% last year. Meanwhile, 4G coverage is available from at least one MNO in 98% of rural premises and in 99%+ of premises in urban areas.

Indoor premises voice coverage

Mobile voice services from all four MNOs have decreased by one percentage point to 93% of premises in Scotland. Urban areas of Scotland have higher levels of coverage at 97% (2023: 98%) inside, compared to 75% (2023: 75%) in rural areas, though there has been a small reduction in the last year. However, almost every premises in Scotland (whether urban or rural) has indoor voice coverage from at least one operator.

Roads coverage

Scotland's road network covers 37,000 miles (15% of the UK total), ranging from major trunk routes to single carriageway sections in remote areas.[35] Good coverage is important along this road network to assist with vehicle communications, navigation, infotainment and safety aids. This sub-section focuses on coverage along Scotland's major roads but a detailed breakdown of coverage along A and B roads can be found via our interactive dashboard.

As shown in Table 3.9 below, in-vehicle 4G coverage from all operators along major roads in Scotland now stands at 74%, seven percentage points higher than 2023. Two per cent of Scotland's major roads are still unable to receive in-vehicle 4G coverage from any MNO. Individual MNO coverage ranges from 86-97%. In-vehicle voice coverage from all operators on major roads in Scotland is down by one percentage point (to 79%). Decreases were seen across all four nations, with the Scottish decrease being the smallest, compared to Wales where there was a five percentage point reduction. Only 1% of major roads does not have voice coverage from any operator.

Table 3.9: In-vehicle 4G and voice coverage on major roads in Scotland, by operator

[35] UK Government, National Statistics: Road Lengths in Great Britain: 2023, 21 March 2024.

MNO	4G	Voice
BT/EE	86%	86%
Three	83%	88%
Virgin Media O2	85%	97%
Vodafone	88%	89%
All operators	74%	79%
At least one operator	98%	99%

Source: Ofcom analysis of MNO predictions (September 2024).

Mobile traffic

Mobile traffic continues to experience growth. Our monthly sample indicates data growth increased in the UK to around 1069 PB, up from around 905 PB in 2023.[36] [37]

There was significant year-on-year data traffic growth in Scotland, at c. 16% (12 PB), to around 88 PB. Of the UK nations, mobile traffic grew fastest in Wales, an increase of c. 20%, with 18% growth in England and 9% growth in Northern Ireland.

Meanwhile, the dominant share (78%) of UK mobile traffic continues to be carried across 4G networks. 4G accounts for around 83% (72 PB) of this year's total data traffic in Scotland.

Further information about these trends can be found in our Connected Nations: UK Report 2024.

3G switch-off is well underway

All MNOs made a commitment to the UK Government to switch off their 2G and 3G networks by 2033 at the latest. This will result in improved network efficiency and enable more spectrum to be used for faster 4G and 5G services.

In February 2023 we set out a number of expectations on mobile providers on 3G and 2G switch off, which are designed to ensure that customers are treated fairly and any disruption to customers is minimised.

The MNOs are responsible for their own switch-off timetables for these legacy technologies, with 3G being switched off first, and this year saw Vodafone and EE both complete their respective 3G switch-offs. Ofcom has received very few complaints from customers about the impact of 3G switch off, and MNOs have not reported any significant distruption related to the switch to Ofcom. Three is in the process of switching off 3G, and Virgin Media O2 plans to switch off its 3G services in 2025. We will continue to closely monitor these switch-off processes through to completion.

[36] Traffic data rounded up to the nearest whole petabyte.
[37] The total traffic reported here is likely to be less than the actual traffic as one of the MNOs has underreported its traffic due to data issues on its performance reporting tool